muratec™

F-114 / F-114P

SERVICE MANUAL

DIGITAL LASER MFP
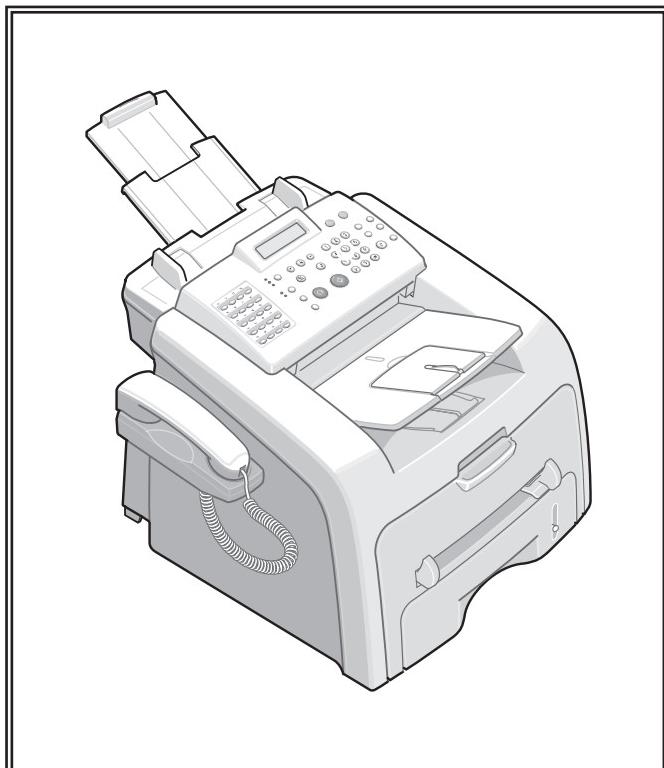
Contents

1. Precautions

2. Product Specifications & Features

3. Disassembly and Reassembly

4. Alignment & Troubleshooting

5. Exploded Views and Parts Lists

6. System Diagram

7. Reference Information

Contents

Continued

4. Alignment & Troubleshooting

Continued

5. Exploded Views & Parts Lists

6. System Diagram

7. Reference Information

1. Precautions

In order to prevent accidents and to prevent damage to the equipment please read the precautions listed below carefully before servicing the printer and follow them closely.

1.1 Safety Warning

(1) Only to be serviced by appropriately qualified service engineers.
High voltages and lasers inside this product are dangerous. This printer should only be serviced by a suitably trained and qualified service engineer.

(2) Use only authorized replacement parts
There are no user serviceable parts inside the printer. Do not make any unauthorized changes or additions to the printer, these could cause the printer to malfunction and create electric shock or fire haz-ards.

(3) Laser Safety Statement
The Printer is certified in the U.S. to conform to the requirements of DHHS 21 CFR, chapter 1 Subchapter J for Class 1(1) laser products, and elsewhere, it is certified as a Class I laser product
con-forming to the requirements of IEC 825. Class I laser products are not considered to be hazardous. The laser system and printer are designed so there is never any human access to laser radiation above a Class I level during normal operation, user maintenance, or prescribed service condition.

Warning >> Never operate or service the printer with the protective cover removed from Laser/Scanner assembly. The reflected beam, although invisible, can damage your eyes. When using this product, these basic safety pre-cautions should always be followed to reduce risk of fire, electric shock, and injury to persons.

CAUTION - INVISIBLE LASER RADIATION
WHEN THIS COVER OPEN.
DO NOT OPEN THIS COVER.

VORSICHT - UNSICHTBARE LASERSTRAHLUNG,
WENN ABDECKUNG GEÖFFNET.
NICHT DEM STRAHL AUSSETZEN.

ATTENTION - RAYONNEMENT LASER INVISIBLE EN CAS
D'OUVERTURE. EXPOSITION DANGEREUSE
AU FAISCEAU.

ATTENZIONE - RADIAZIONE LASER INVISIBILE IN CASO DI
APERTURA. EVITARE L'ESPOSIZIONE AL
FASCIO.

PRECAUCION - RADIACION LASER IVISIBLE CUANDO SE ABRE.
EVITAR EXPONERSE AL RAYO.

ADVARSEL. - USYNLIG LASERSTRÅLNING VED ÅBNING, NÅR
SIKKERHEDSBRYDERE ER UDE AF FUNKTION.
UNDGÅ UDSAETTELSE FOR STRÅLNING.

ADVARSEL. - USYNLIG LASERSTRÅLNING NÅR DEKSEL
ÅPNES. STIRR IKKE INN I STRÅLEN.
UNNGÅ EKSPONERING FOR STRÅLEN.

VARNING - OSYNLIG LASERSTRÅLNING NÄR DENNA DEL
ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD.
BETRAKTA EJ STRÅLEN. STRÅLEN ÄR FARLIG.

VARO! - AVATTAESSA JA SUOJALUKITUS OHITETTAESSA
OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASER-
SÄTEILYLLE ÄLÄ KATSO SÄTEESEEN.

注　意 - 严禁渴开此盖, 以免激光泄露灼伤

주　의 - 이 덮개를 열면 레이저광에 노출될 수 있으므로 주의하십시오.

1.2 Caution for safety

1.2.1 Toxic material

This product contains toxic materials that could cause illness if ingested.

(1) If the LCD control panel is damaged it is possible for the liquid inside to leak. This liquid is toxic. Contact with the skin should be avoided, wash any splashes from eyes or skin immediately and contact your doctor. If the liquid gets into the mouth or is swallowed see a doctor immediately.

(2) Please keep toner cartridges away from children. The toner powder contained in the toner cartridge may be harmful and if swallowed you should contact a doctor.

1.2.2 Electric Shock and Fire Safety Precautions

Failure to follow the following instructions could cause electric shock or potentially cause a fire.

(1) Use only the correct voltage, failure to do so could damage the printer and potentially cause a fire cause an electric shock.

(2) Use only the power cable supplied with the printer. Use of an incorrectly specified cable could cause the cable to overheat and potentially cause a fire.

(3) Do not overload the power socket, this could lead to overheating of the cables inside the wall and could lead to a fire.

(4) Do not allow water or other liquids to spill into the printer, this can cause electric shock. Do not allow paper clips, pins or other foreign objects to fall into the printer these could cause a short circuit leading to an electric shock or fire hazard..

(5) Never touch the plugs on either end of the power cable with wet hands, this can cause electric shock. When servicing the printer remove the power plug from the wall socket.

(6) Use caution when inserting or taking off the power plug. The power plug has to be inserted completely. If not, a fire will be caused due to poor contact. When taking off the power plug, grip the plug and remove it.

(7) Take care of the power cable. Do not allow it to become twisted, bent sharply round corners or other wise damaged. Do not place objects on top of the power cable. If the power cable is damaged it could overheat and cause a fire or exposed cables could cause an electric shock. Replace a damaged power cable immediately, do not reuse or repair the damaged cable. Some chemicals can attack the coating on the power cable, weakening the cover or exposing cables causing fire and shock risks.

(8) Ensure that the power sockets and plugs are not cracked or broken in any way. Any such defects should be repaired immediately. Take care not to cut or damage the power cable or plugs when moving the machine.

(9) Use caution during thunder or lightening storms. It is recommend that this machine be disconnected from the power source when such weather conditions are expected. Do not touch the machine or the power cord if it is still connected to the wall socket in these weather conditions.

(10) Avoid damp or dusty areas, install the printer in a clean well ventilated location. Do not position the machine near a humidifier. Damp and dust build up inside the machine can lead to overheating and cause a fire.

(11) Do not position the printer in direct sunlight. This will cause the temperature inside the printer to rise possibly leading to the printer failing to work properly and in extreme conditions could lead to a fire.

(12) Do not insert any metal objects into the machine through the ventilator fan or other part of the casing, it could make contact with a high voltage conductor inside the machine and cause an electric shock.

1.2.3 Handling Precautions

The following instructions are for your own personal safety, to avoid injury and so as not to damage the printer

(1) Ensure the printer is installed on a level surface, capable of supporting its weight. Failure to do so could cause the printer to tip or fall.
(2) printer contains many rollers, gears and fans. Take great care to ensure that you do not catch your fingers, hair or clothing in any of these rotating devices.
(3) Do not place any small metal objects, containers of water, chemicals or other liquids close to the printer which if spilled could get into the machine and cause damage or a shock or fire hazard.
(4) Do not install the machine in areas with high dust or moisture levels, beside on open window or close to a humidifier or heater. Damage could be cause to the printer in such areas.
(5) Do not place candles, burning cigarettes, etc on the printer, These could cause a fire.

1.2.4 Assembly / Disassembly Precautions

Replace parts carefully, always use authorized parts. Take care to note the exact location of parts and also cable routing before dismantling any part of the machine. Ensure all parts and cables are replaced correctly.
Please carry out the following procedures before dismantling the printer or replacing any parts.

(1) Check the contents of the machine memory and make a note of any user settings. These will be erased if the mainboard or network card is replaced.
(2) Ensure that power is disconnected before servicing or replacing any electrical parts.
(3) Disconnect printer interface cables and power cables.
(4) Only use approved spare parts. Ensure that part number, product name, any voltage, current or temperature rating are correct.
(5) When removing or re-fitting any parts do not use excessive force, especially when fitting screws into plastic.
(6) Take care not to drop any small parts into the machine.
(7) Handling of the Toner Cartridge
  - The OPC Drum can be irreparably damaged if it exposed to light.
    Take care not to expose the OPC Drum either to direct sunlight or to fluorescent or incandescent room lighting. Exposure for as little as 5 mins can damage the surface's photoconductive properties and will result in print quality degradation. Take extra care when servicing the printer. Remove the OPC Drum and store it in a black bag or other lightproof container. Take care when working with the covers(especially the top cover) open as light is admitted to the OPC area and can damage the OPC Drum.
  - Take care not to scratch the green surface of OPC Drum Unit.
    If the green surface of the Drum Cartridge is scratched or touched the print quality will be compromised.

1.2.5 Disregarding this warning may cause bodily injury

(1) Be careful with the high temperature part.
The fuser unit works at a high temperature. Use caution when working on the printer. Wait for the fuser to cool down before disassembly.

(2) Do not put finger or hair into the rotating parts.
Take care when using a printer. It contains many rotating parts. Ensure that fingers, hair, clothing etc. do not become caught in the mechanism as this could cause injury.

(3) When you move the printer.
This printer weighs 10kg including toner cartridge and cassette. Use safe lifting and handling techniques. Use the lifting handles located on each side of the machine. Back injury could be caused if you do not lift carefully.

(4) Ensure the printer is installed safely.
The printer weighs 10Kg, ensure the printer is installed on a level surface, capable of supporting its weight. Failure to do so could cause the printer to tip or fall possibly causing personal injury or damaging the printer.

(5) Do not install the printer on a sloping or unstable surface. After installation, double check that the printer is stable.

1.3 ESD Precautions

Certain semiconductor devices can be easily damaged by static electricity. Such components are commonly called "Electrostatically Sensitive (ES) Devices", or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor "chip" components.

The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

Caution >>Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

1. Immediately before handling a semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, employ a commercially available wrist strap device, which should be removed for your personal safety reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ESDs, place the assembly on a conductive surface, such as aluminum or copper foil, or conductive foam, to prevent electrostatic charge buildup in the vicinity of the assembly.

3. Use only a grounded tip soldering iron to solder or desolder ESDs.

4. Use only an "anti-static" solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESDs.

5. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.

6. Do not remove a replacement ESD from its protective packaging until immediately before installing it. Most replacement ESDs are packaged with all leads shorted together by conductive foam, aluminum foil, or a comparable conductive material.

7. Immediately before removing the protective shorting material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.

8. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged or soldered into the circuit.

9. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting one's foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

2. Product specification and feature

2.1 Product Specifications

Specfications are correct at the time of printing. Product specifications are subject to change without notice. See below for product specifications.

Items		F-114 Series	
		F-114P	F-114
Model Name		Fax,Copier,Printer,Scanner	Fax,Copier
Functions			
General	Size (W*D*H) w/o Hand Set	363.0 * 398.0 * 308.3(mm)	363.0 * 398.0 * 308.3(mm)
	Weight Without Toner Cartridge With Toner Cartridge	10kg 11.5kg	10kg 11.5kg
	LCD	16*2	16*2
	Interface	USB 1.1	USB 1.1 : f/w Down Load
	AMV(Average Month Volume) Printing	500	-
	Scan to Copy or Scan to Fax	500	500
	Duty cycle, Monthly Printing	Up to 10,000 pages	Up to 10,000 pages
	ADF SCAN	Up to 2,000 pages	Up to 2,000 pages
	Engine Life	Up to 120,000 Pages	Up to 120,000 Pages
Power Consumption	Power Switch	Yes	Yes
	Input Voltage	AC110V~127V, 220V ~ 240V	AC110V~127V, 220V ~ 240V
	Power Sleep Mode	Energy Star Compliant	Energy Star Compliant
**Noise	Operating(ADF)	Less than 52 dBA	Less than 52 dBA
	Standby	Less than 39 dBA	Less than 39 dBA
	Printing	Less than 509 dBA	Less than 50 dBA (Fax Rec., Memory Copy)
EMI Approval	EMI Approval	Class B	Class B
PC Print	Power Save Mode	Yes (5/10/15/30/45min.off)	Yes (5/10/15/30/45min.off)
	Print Method	Laser	Laser
	N/W I/f	No	No
	* Speed (Engine)	Up to 16 PPM in A4 size, Up to 17 PPM in Letter size	-
	Resolution Normal	Up to 600 x 600 DPI effective output	-
	RET	No	-
	Print Language	GDI	-
	Toner Save	Yes	Yes(Text Mode)
	Fpot Stand by	Approx. 12 seconds	-
	Power Save	Less than 42 seconds	-
	Printable Area	208 x 273 mm (Letter)	-
	Duplex Print	Manual (driver support provided)	-

* Speed will be affected by Operating System used, computing performance, application software, connecting method, media type, media size and job complexity.

** Sound Pressure Level, ISO 7779

Items			F-114 Series	
Model Name			F-114P	F-114
Scan	Halftone		256level	256level
	Scan Method		"CIS, Mono"	"CIS, Mono"
	*Scan Speed (Second /scan)	Gray	Up to 72 sec	-
		Color	-	-
		Black&White	Up to 25 sec	-
	Resolution(Optical)		Up to 200 x 200 DPI effective output	Up to 200 x 200 DPI effective output
	Halftone		256level	-
	Scan Width	Max	216mm	-
		Effective	208mm	-
	Scan Length	Max	400mm	-
Copy	Speed		Up to 16 PPM in A4 size, Up to 17 PPM in Letter size	Up to 16 PPM in A4 size, Up to 17 PPM in Letter size
	Resolution		Up to 300 x 300 DPI effective output	Up to 300 x 300 DPI effective output
	Halftone		256level	256level
	Copy Quality Selection or Original Image type selection Mode	Text Photo	16sec/Letter 16sec/letter	16sec/Letter 16sec/letter
	FCOT	Power Save	Yes	Yes
		Stand by	approx : 30sec	approx : 30sec
	*Copy Speed	SDMC	Up to 16 PPM in A4 size, Up to 17 PPM in Letter size	Up to 16 PPM in A4 size, Up to 17 PPM in Letter size
		MDMC	3cpm	3cpm
	Zoom Range		50-150%	50-150%
	Multi Copy		1~99	1~99
Telephone	Handset		Yes	Yes
	1-Touch Dial		20	20
	Speed Dial		80	80
	TAD		No	No
	TAD I/F		Yes	Yes
	Tone/Pulse		Tone (DTMF)	Tone (DTMF)
			Pulse : setting in tech mode	Pulse : setting in tech mode
	Earth/Recall		No	No
	SMS		No	No
	External Phone Interface		Yes	Yes
Fax	Compatibility		ITU-T G3	ITU-T G3
	Communication System		PSTN/PABX	PSTN/PABX
	Modem Speed		33.6Kbps	33.6Kbps
	TX Speed		approx. 3 sec	approx. 3 sec
	Compression		MH/MR/MMR	MH/MR/MMR
	ECM		Yes	Yes
	Resolution	Std	Up to 203 x 98 DPI effective output	Up to 203 x 98 DPI effective output
		Fine	Up to 203 x 196 DPI effective output	Up to 203 x 196 DPI effective output
		S.Fine	Up to 203 x 392 DPI effective output	Up to 203 x 392 DPI effective output
		Std	Up to 6 sec	Up to 6 sec
		Fine	Up to 12 sec	Up to 12 sec
		S.Fine	Up to 24 sec	Up to 24 sec

Items			F-114 Series	
Model Name			F-114P	F-114
Fax (Continued)	Halftone		256level	256level
	Memory	Capacity	Total memory: 8MB(Fax: 2MB)	Total memory: 8MB(Fax: 2MB)
		Optional Memory	No	No
		Broadcasting	Yes	Yes
		Delay TX	Yes	Yes
		Memory RX	Yes	Yes
	Functions	Voice Request	No	No
		TTI	Yes	Yes
		RTI	Yes	Yes
		Polling	Rx Polling	Rx Polling
		Security Receive	Yes	Yes
		Flash	No	No
		Auto Reduction	Yes	Yes
		"F/W Upgrade from Remote"	Yes	Yes
	Memory B/U		Yes(96 Hour)	Yes(96 Hour)
Paper Handling	Casstte	Type	Cassette	Cassette
		Input Capacity	250Sheets/20lb	250Sheets/20lb
		Optional Cassette	No	No
		Output Capacity	Max. 150 sheets/20lb	Max 150 sheets/20lb
		Output Control	Face down	Face down
		Bypass	1sh	1sh
		Media Size for Main Tray	For Fax and Copy: A4,Letter, Legal For PC Print : A4,Letter Legal. Folio, Executive, B5	For Fax and Copy: A4,Letter, Legal For PC Print : A4,Letter, Legal. Folio, Executive, B5"
		Media Size for Bypass	Envelope6 3/4, 7 3/4,#9, #10,DL,C5,B5	Envelope6 3/4, 7 3/4,#9, #10,DL,C5,B5
		Media Weight	Auto : 16 ~ 28 lb Bypass: 16 ~ 43 lb	Auto : 16 ~ 28 lb Bypass: 16 ~ 43 lb
	ADF	Input Capacity	Min. 20 Sheets	Min. 20 Sheets
		Media Weight	12.5lb ~ 28lb, 32lb(1 sheet)	12.5lb ~ 28lb, 32lb(1 sheet)

* Copy or Scan speed will be affected by Operating System used, computing performance, application software, connecting method, media type, media size and job complexity.

Items			F-114 Series	
Model Name			F-114P	F-114
Software	Windows Compatiblity (Scan/Print)	Win 2000	Yes	No
		Win 2003	Yes	No
		Win XP	Yes	No
		Win Vista	Yes	No
	Driver	GDI Printer	SPL	No
		TWAIN	Yes	No
		FaxRCP (Windows ONLY)	Yes	No
		Mac Printer	Yes	No
		Mac Scanner	No	No
		Linux Printer	Yes	No
		Linux Scanner	Yes	No
		PC-FAX	No	No
	M/S Certification	WHQL	Yes (Win 2000/2003/XP)	-
		WIA	No	No
	Bundle S/W		SmarThru 3	-
	Media	CD-ROM	Yes	-
		Manual	Standalone Fax: Book MFP: CD	Standalone Fax: Book
		Diskette	No	No
Consumables	Life	Initial	1,000 Pages	1,000 Pages
		Running	3,000 Pages	3,000 Pages
	Toner Sensor (Software)		Yes(Dot Counter)	Yes(Dot Counter)
Periodic Replacing Parts			Pick Up Roller : Up to 60,000 sheets Transfer Roller : Up to 60,000 sheets Fuser Assembly : Up to 60,000 sheets ADF Roller : Up to 60,000 sheets ADF Rubber : Up to 10,000 sheets	

2.2 Summary of Product

This chapter describes the functions and operating principals of the main components.

2.2.1 Printer Components

2.2.1.1 Front View

Automatic Document Feeder

Document input Support

Control Panel

Document Output Tray

Front Output Tray (face down)

Paper Output Support

Front Cover

Toner Cartridge

Handset

Bypass Tray

**Paper Tray**

Items			F-114 Series	
Model Name			F-114P	F-114
Software	Windows Compatiblity (Scan/Print)	Win 2000	Yes	No
		Win 2003	Yes	No
		Win XP	Yes	No
		Win Vista	Yes	No
	Driver	GDI Printer	SPL	No
		TWAIN	Yes	No
		FaxRCP (Windows ONLY)	Yes	No
		Mac Printer	Yes	No
		Mac Scanner	No	No
		Linux Printer	Yes	No
		Linux Scanner	Yes	No
		PC-FAX	No	No
	M/S Certification	WHQL	Yes (Win 2000/2003/XP)	-
		WIA	No	No
	Bundle S/W		SmarThru 3	-
	Media	CD-ROM	Yes	-
		Manual	Standalone Fax: Book MFP: CD	Standalone Fax: Book
		Diskette	No	No
Consumables	Life	Initial	1,000 Pages	1,000 Pages
		Running	3,000 Pages	3,000 Pages
	Toner Sensor (Software)		Yes(Dot Counter)	Yes(Dot Counter)
Periodic Replacing Parts			Pick Up Roller : Up to 60,000 sheets Transfer Roller : Up to 60,000 sheets Fuser Assembly : Up to 60,000 sheets ADF Roller : Up to 60,000 sheets ADF Rubber : Up to 10,000 sheets	

2.2.1.3 Control Panel

< F-114 / F-114P >
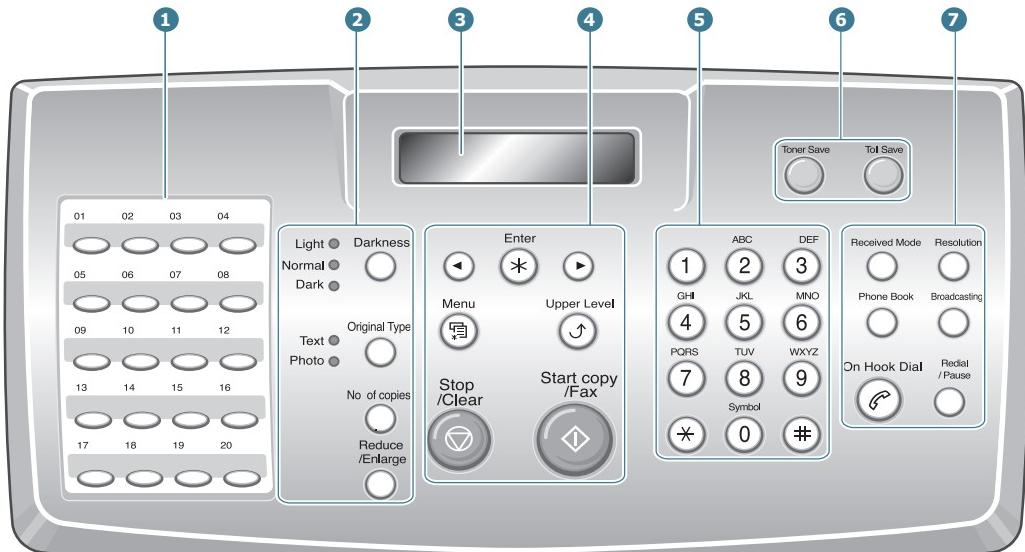
1		Use to store frequently-dialed fax number and dial them with a single button touch.
2 C O P Y	Darkness	Adjusts the brightness of the documents for the current copy job.
	Original Type	Selects the document type for the current copy job.
	Reduce /Enlarge	Makes a copy smaller or larger than the original document.
	No. of copies	Selects the number of copies.
3		Displays the current status and prompts during an operation.
4	◄ ►	Scrolls through the options available for the selected menu item.
	Enter	Confirms the selection on the display.
	Menu	Enters Menu mode and scrolls through the menus available.

4	Upper Level ↺	Sends you back to the upper menu level.
	Stop /Clear ⏹	Stops an operation at any time. In Standby mode clears/cancels the copy options such as the darkness, the document type setting, the copy size and the number of copies.
	Start copy /Fax ◇	Starts a job.
5	1 2 3 4 5 6 7 8 9 * 0 #	Dials a number or enters alphanumeric characters.
6 S A V E	Toner Save ◯	Allows you to save on toner by using less toner to print a document.
	Toll Save ◯	Allows you to save on call costs by sending a fax at a preset toll-saving time. Using this feature you can take advantage of lower long distance rates at night for example.
7 F A X	Received Mode ◯	Allows you to select the fax receiving mode.
	Phone Book ◯	•Allows you to store frequently-dialed fax numbers using a one or two-digit speed dial or group number for automatic dialling, and edit the stored numbers. •Allows you to print a Phonebook list.
	Resolution ◯	Adjusts the resolution of the documents for the current fax job.
	Broadcasting ◯	Allows you to send a fax to multiple destinations.
	On Hook Dial ✆	Engages the telephone line.
	Redial /Pause ◯	Redials the last number in Standby mode or inserts a pause into a fax number in Edit mode.

2.2.2 Overview of System

The F-114 / F-114P can be divided into the following main constituent parts: Main Controller, Operator's Panel, PC Interface, Scanner, Line Interface and Power Supply. The Main Controller uses an SPGPm processor. The Operator's panel; (OPE) has its own MICOM which communicates serially with a UART built into the SPGPm processor. The Scanner uses an Image Processor chip (CIP4) to control the CIS. The Line Interface an FM336 integrated with the Main Board and communicates with the LIU at speeds up to 33.6Kbps. The Power Supply has both the SMPS and HVPS integrated on one PBA.

2.2.2.1 Main Controller.

The Main Controller of the F-114 / F-114P consists of two ASICs (CPU, Image Processor), Scanner, Fax Modem and Print sections. Bus Control, I/O Handling, Scanner, all motor drivers and the PC Interface function is controlled by the CPU.
It uses the chorus2. These control the peripherals and the Image Processing.

2.2.2.2 Line Interface.

This part connects the set with the PSTN. The main functions of this section are Line Interface, Line Monitoring, and connection to an external phone or TAD using the built in EXT connector..

2.2.2.3 Print Engine.

The Print Engine consists of the following sections: Frame, Paper Feed, Image Transfer, Imaging Unit, Toner Cartridge, Fuser, High Voltage Supply and Scanner. The set uses an Electro Photographic process using the LSU to develop a latent image on the OPC drum. The Toner process is a single part diamagnetic process. Copy and Transfer processes use a CIS Module.

2.2.2.4 Scanner.

The scanner is designed around a 200dpi CIS module. The CIS scanning width is maximum 216mm, effective width is 208mm. The F-114 operates at 200lpi, the F-114P operates at 300 lpi.

2.2.2.5 Summary of Main Unit

- Main Board

This is an integral unit having the Engine and Video control on a single PBA. It controls the Electrophotographic Process to take the image from the PC Interface and generate the Video Data for the LSU. It also manages the transfer of that image onto paper and the fusing of the image. The main PBA unit consists of the following circuits: Motor (Paper Feed and Exit) Driver, the Clutch driver, Pre-transfer Lamp Driver, the Fuser Driver and the Fan Driver. The signals from the Paper Feed Sensor, the Paper Empty Sensor, MP sensor and Exit Sensor are input to the Main Board from the SMPS/HVPS PBA.

- SMPS Board & HVPS Board

These are integrated into a singe PBA. The Power Supply uses the 110VAC/220VAC supply voltage to generate the DC Voltages used by the system. The SMPS has 3 output channels (+5V, +12V, +24V, +24VS) and supplies the Main Board and the OPE Board.

The HVPS creates the high voltages (THV/MHV/Supply/Dev) used for the electrophotographic process. The high voltage is created from the 24VS line from the SMPS. High Voltage output is supplied to the Toner, the OPC Cartridge and the Transfer Roller.

- OPE Board

The Operation Panel is driven by its own internal program using the OPE MICOM chip separate from the Main Board processor. Data is transferred using the UART Port in the Main Controller serially. This unit consists of the MICOM, the Key Pad Matrix and the LCD.

- Toner Cartridge

The Toner Cartridge consists of integrated Exposure and Developer units. The Exposure Unit consists of the OPC Drum and the Charge Roller, and the Developer Unit consists of the toner particles and its tank, the Supply Roller and the Developer Roller.

- LSU (Laser Scanner Unit)

This is the core of the laser printer. It converts the video data received from the computer into an electrostatic latent image on the surface of the OPC drum. This is achieved by controlling the laser beam and exposing the surface of the OPC drum to the laser light. A rotating polygon mirror reflects the laser light onto the OPC and each side of the mirror is one scan line. The OPC drum turns as the paper feeds to scan the image down the page.

The /HSYNC signal is created when the laser beam from LSU reaches the end of the polygon mirror and this signal is sent to the controller. The controller detects the /HSYNC signal to adjust the vertical line of the image on paper. In other words after the /HSYNC signal is detected the image data is sent to the LSU to adjust the left margin on the paper.

- Toner Transfer

Toner is transferred from the OPC drum onto the paper using a PTL (Pre-transfer Lamp) and a transfer roller. The PTL shines light onto the OPC, this reduces the electrical charge on the surface of the OPC surface and improves the efficiency of the transfer.
The transfer roller transfers toner from the OPC drum to the paper.
Life span: Print over 100,000 sheets (at 15~30ºC)

- Fuser

This consists of a heat lamp, heat roller, pressure roller, thermistor and thermostat. By use of heat and pressure toner is caused to melt and adhere to the paper surface in order to complete the printing process.

2.2.3 System Layout

2.2.3.1 Feeding section

There is a universal cassette which automatically loads paper and the manual feed which supplies paper single sheet at a time. The cassette has a friction pad which separates paper to ensure single sheet feeding, and it has a sensor, which checks when the paper tray is empty.

- Feeding Method: Universal Cassette Type
- Feeding Standard: Center Loading
- Feeding Capacity: Cassette-250 sheets (75g/m², 20lb paper standard)
            Manual 1 sheet (Paper, OHP, Envelop, etc.)
- Paper detecting sensor: Photo sensor
- Paper size sensor: None

2.2.3.2 Transfer Ass'y

This consists of the PTL (pre-transfer lamp) and the Transfer Roller. The PTL shines a light onto the OPC drum. This lowers the charge on the drum's surface and improves transfer efficiency.
The transfer roller transfers toner from the OPC drum surface to the paper.

- Life expectancy: Over 60,000 sheets (at 15~30°C)

2.2.3.3 Driver Ass'y

- Gear driven power unit. The motor supplies power to the paper feed unit, the fuser unit, and the toner cartridge.

2.2.3.4 Fixing Part(Fuser)

- The fuser consists of the Heat Lamp, Heat Roller, Pressure Roller, Thermistor, and Thermostat. It fixes toner to the paper using pressure and heat to complete the printing job.

2.2.3.4(a) Temperature-Intercepting Device (Thermostat)
The thermostat is a temperature sensing device, which cuts off the power to the heat lamp to prevent overheating fire when the heat lamp or heat roller overheats.

2.2.3.4(b) Temperature Detecting Sensor (Thermistor)
The Thermistor detects the surface temperature of the heat roller, this information is sent to the main processor which uses this information to regulate the temperature of the heat roller.

2.2.3.4(c) Heat Roller
The surface of the Heat Roller is heated by the Heat Lamp. As the paper passes between the Heat and Pressure rollers the toner is melted and fixed permanently to the paper. The surface of the roller is coated with Teflon. This ensures that toner does not adhere to the roller surface.

2.2.3.4(d) Pressure roller
The Pressure Roller mounted under the heat roller, it is made of a silicon resin, and the surface of the roller is coated with Teflon. This ensures that toner does not adhere to the roller surface.

2.2.3.4(e) Safety Features

· To prevent overheating
 - 1st protection device: Hardware cuts off when overheated
 - 2nd protection device: Software cuts off when overheated
 - 3rd protection device: Thermostat cuts off mains power to the lamp.

· Safety device
 - Fuser power is cut off when the front cover is opened
 - LSU power is cut off when the front cover is opened
 - The temperature of the fuser cover's surface is maintained at less than 80ºC to protect the user and a caution label is attached where the customer can see it easily when the rear cover is opened.

2.2.3.5 Scanner

· **Scan Image Controller**
 1.Minimum Scan Line Time : 1.23ms
 2.Scan Resolution : Color (Max 600 DPI)
 3.Scan Width : 208mm
 4.Function
  - White Shading Correction
  - Gamma Correction
  - CIS Interface
  - 256 Gray Scale

· **CIS Driver Circuit**
  - CIS Max Frequency : 0.5MHz
  - CIS Line Time : 5ms
  - White Data Output Voltage : Max 1.2V

· **Tx Driver Circuit**
  - Tx Motor Speed : Max 2200pps
  - Motor Driver : STA471A
  - Voltage : 24V DC

2.2.3.6 LSU (Laser Scanner Unit)

This is the core of the laser printer. It converts the video data received from the computer into an electrostatic latent image on the surface of the OPC drum. This is achieved by controlling the laser beam and exposing the surface of the OPC drum to the laser light. A rotating polygon mirror reflects the laser light onto the OPC and each side of the mirror is one scan line. The OPC drum turns as the paper feeds to scan the image down the page.

The /HSYNC signal is created when the laser beam from LSU reaches the end of the polygon mirror and this signal is sent to the controller. The controller detects the /HSYNC signal to adjust the vertical line of the image on paper. In other words after the /HSYNC signal is detected the image data is sent to the LSU to adjust the left margin on the paper.

2.2.3.7 Toner Cartridge

The toner cartridge is an integral unit containing the OPC unit and toner unit. The OPC unit consists of the OPC drum and charging roller, and the toner cartridge unit consists of the toner, supply roller, developing roller, and blade (Doctor blade)

- Developing Method: Non magnetic 1 element contacting method
- Toner: Non magnetic 1 element shatter type toner
- The life span of toner: 3,000 sheets (IDC Pattern/A4 standard)
- Toner remaining amount detecting sensor: Yes
- OPC Cleaning: Electrostatic process
- Management of waste toner: Collect the toner using a Cleaning Blade
- OPC Drum protecting Shutter: Yes
- Classifying device for toner cartridge: ID is classified by interruption of the frame channel
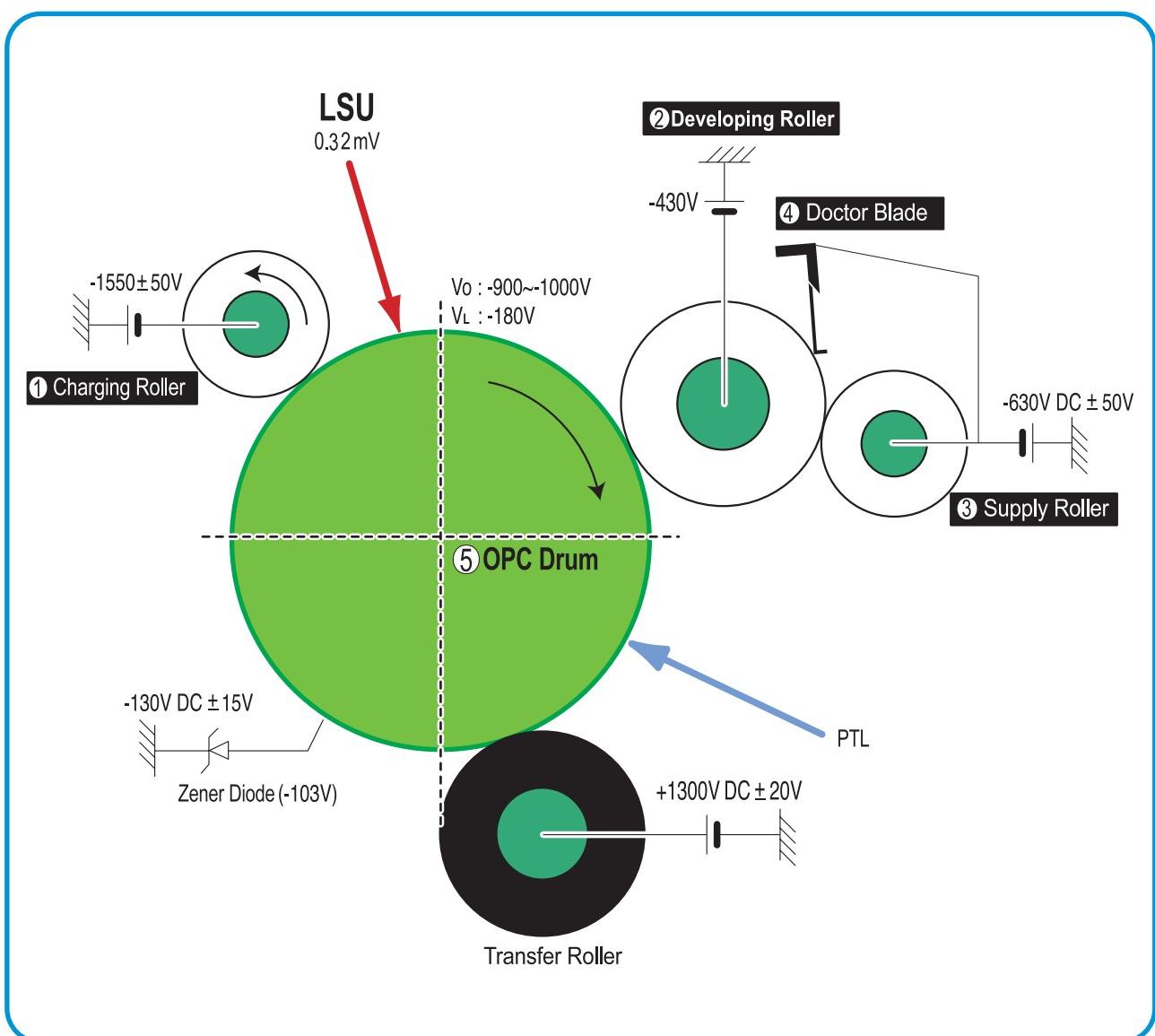
2.2.4 Main PBA(SPL Model)

The Engine Board and Controller Board have been integrated into a single PBA. This consists of the CPU, printer scanner and line control functions. The CPU functions as the bus controller, I/O handler, motor driver and PC inter-face. The main board sends the Current Image Video data to the LSU and manages the Electrophotographic printing process. Circuits on the PBA drive include the main motor (paper feed, cartridge, fuser), clutch driver, pre-transfer lamp driver, heat-lamp driver, CIS driver, scan motor driver, modem and fan driver.
The signals from the paper feed jam sensor and paper empty sensor are inputted to the main board from the power supply PBA.

Line interface circuit, it is a circuit for interfacing a telephone line with a modem and DAA. The circuit consists of a matching circuit to conform to the impedance of the receiving telephone line and a circuit to conform to the impedance of a modem.
Also, there is a ring detect circuit to detect a ring signal from the switchboard and a surge absorber to protect against lighting strike surges on the incoming line.
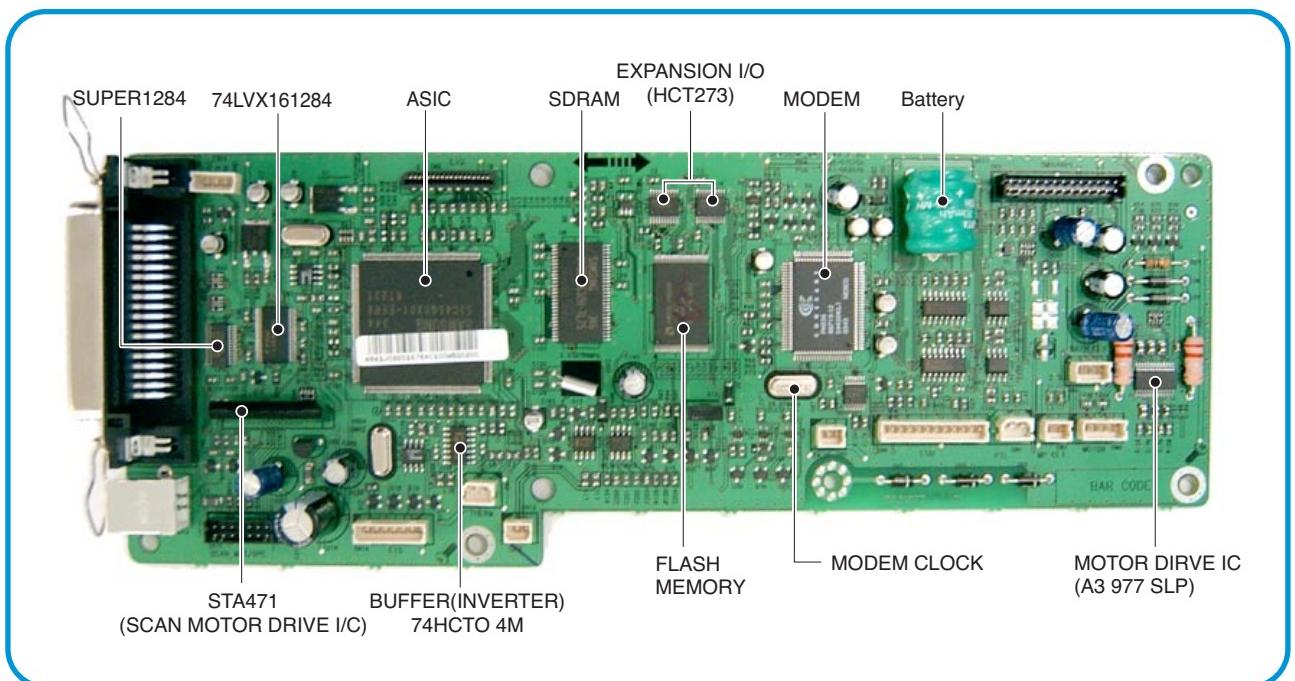
2.2.4.1 ASIC (Chorus2)

The unt's S3C46Q0X 16/32-bit RISC micro controller is designed to provide a cost-effective, low power, small die size and high performance micro-controller solution for MFP.
The S3C46Q0X is developed using ARM7TDMI core, 0.18(m CMOS standard cell, and memory cell.

•Main function block
- 1.8V internal, 3.3V external (I/O boundary) microprocessor with 4KByte Cache
- Image Processor
- On-chip clock generator with PLL
- Memory & External Bank Control
- DMA Control (5-channel)
- Interrupt Control
- 2-port USB Host /1- port USB Device (ver 1.1) Interface Control
- UART (2 Channel)
- Synchronous Serial Interface Control
- Timer (4 Channel)
- Watch Dog Timer
- Power control: Normal, Slow, Idle, Stop and SL_IDLE mode
- A/D Converter (10-bit, 2 Channel)
- General I/O Port Control
- Print Head Control
- Carrier Motor Control
- Paper Motor Control
- Tone Generator
- RTC with calendar function
- S/W Assistant function(Rotator)

2.2.4.2 Flash Memory

This stores the system program. Firmware upgrade is achieved by downloading from the new image using the PC Interface.

- Capacity : 0.5 M Byte
- Access Time : 70 nsec

2.2.4.3 SDRAM

This is used as a buffer, system working memory area, etc. while printing and scanning. This memory is also used to store faxes waiting to be sent or waiting to be printed.

- Access Time : 60 nsec

2.2.4.4 Sensor input circuit

1) Paper Empty Sensor

The Paper Empty sensor (Photo Interrupter) on the SMPS/HVPS PBA is monitored by the CPU on signal(nP_EMPTY, CN3-Pin 1). When the cassette is empty the printer displays a message on the LCD panel.

2) MP Sensing

Presence of paper in the MP tray is detected by operation of the MP Sensor (Photo Interrupter) on the SMPS/HVPS PBA. The CPU monitors signal(MP_EMPTY, CN3-Pin 13) to recognize paper in the MP, and paper is fed from MP if there is paper present.

3) Paper Feed Sensor, (Toner Cartridge Sensor)

When paper passes the actuator on the feed sensor, it is detected by the Photo interrupter. signal(nP_FEED, CN3-Pin 2) monitored by the CPU and this signal starts the process of creating the image after certain delay time If the feed sensor is not detected within 1 sec. after paper is fed, a paper Jam0 occurs. (Displayed on the LCD panel).
When a toner cartridge is inserted it also operates the Paper Feed sensor. A message is displayed on the LCD if no cartridge is detected.

4) Paper Exit Sensor

This detects that paper exits cleanly from the Machine using an exit sensor on the engine board and actuator on the frame. The monitors signal(P_EXIT, CN3-Pin 26) and detects the on/off time of the exit sensor and if jam status is detected then JAM2 is displayed the on the LCD panel.

5) Cover Open Senser

The Cover open sensor actuator is located on the front cover and the senor is in the main frame. When the front cover is opened the +24VS to the DC fan, solenoid, main motor, polygon motor part of LSU, HVPS that are cut off. The CPU monitors signal(COVER_OPEN) to recognize when the cover is opened.

6) DC FAN / SOLENOID Driving

It is driven by a transistor and controlled by signal(FAN, CN3-Pin 24) bit of the CPU.
When it is high the fan is activated by turning on the TR, and it is off when the sleep mode is selected. There are two solenoids and these are driven by the Paper Pick-up and MP signals. The drive time is 300ms. The diode protects the driving TR from the Back-EMF pulse which is generated when the solenoid is de-energized.

7) Motor Driving

The motor driving circuit is activated when the Driver IC is enabled. An A3977 (Motor driver IC) is used in this case. The resistance Rs value of sensing and the voltage value of the V reference can be changed by the motor driving voltage value.

2.2.5 SMPS & HVPS

The SMPS and HVPS are on one integrated board.
The SMPS supplies the DC power to the system. It takes either 110V or 220V and outputs the +5V,
-5V/0.5A, 12V and 24V supplies to the main and ADF PBAs.
The HVPS creates the high voltage of THV/MHV/Supply/Dev and supplies it to the toner cartridge. The CPU is used to modify some of these voltage settings to provide the ideal voltages to create the image.
The HVPS part uses the 24V and outputs the high voltage for THV/MHV/BIAS and the outputted high voltage is supplied to the toner, OPC cartridge and transfer roller.
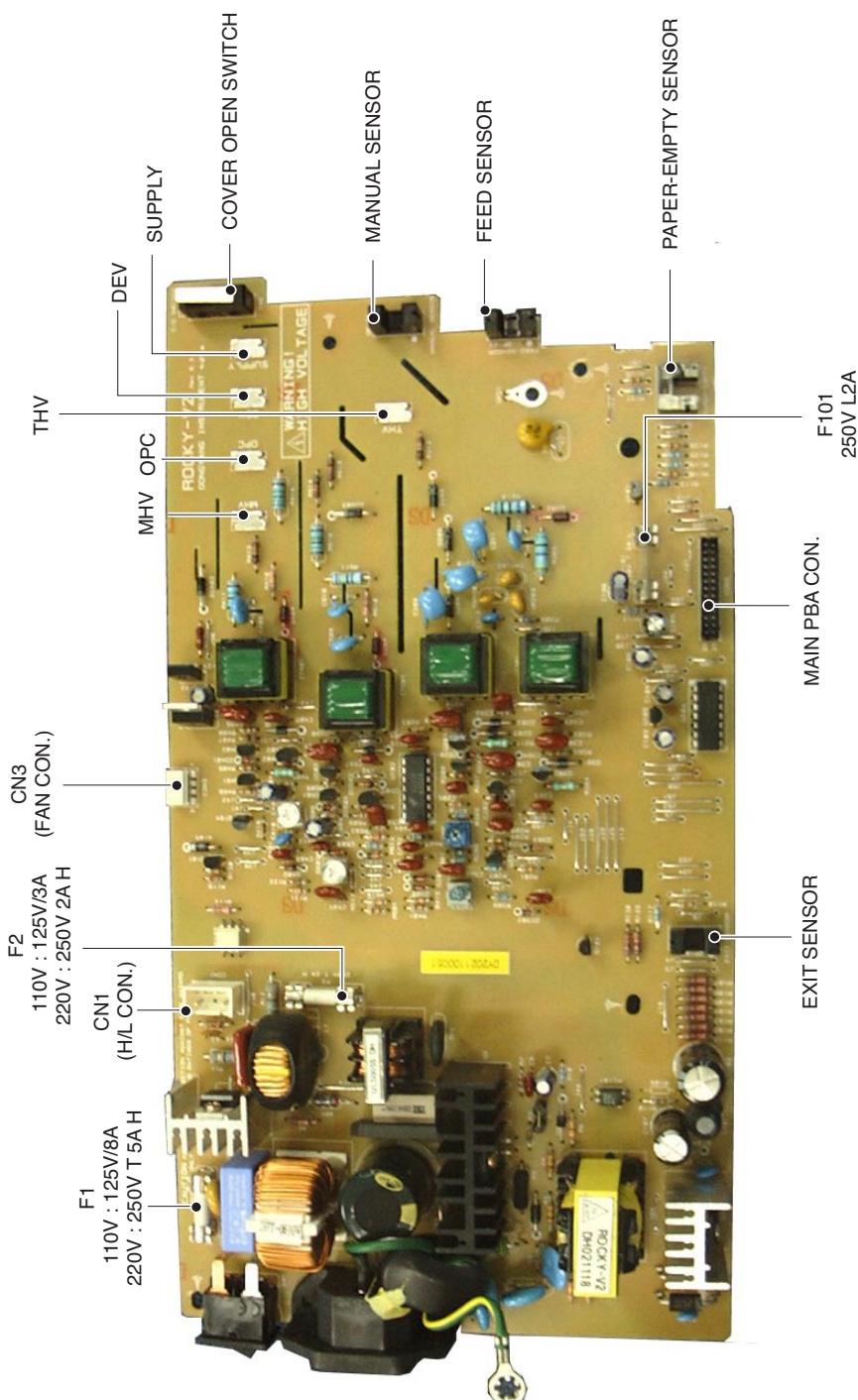
2.2.5.1 HVPS(High Voltage Power Supply)

1) Transfer High Voltage (THV+)
  - Function : It is this voltage that transfers toner from the OPC Drum to the paper.
  - Output voltage : +1300V DC±20V
  - Error : IF THV (+) is not present, low density printing occurs due to toner on the OPC Drum not being transferred to the paper. It is possible that waste toner over-flow can occur if this condition persists. Ghost images may appear which repeat at 76mm intervals.

2) Charge Voltage (MHV)
  - Function : It is this voltage that charges the surface of the OPC to -900V ~ -1000V.
  - Output voltage : -1550V DC ± 50V
  - Error : IF MHV is not present toner then since the OPC drum surface has no charge toner is attracted to the whole OPC surface. A black page is printed out when this happens.

3)Cleaning Voltage (THV-)
  - Function : It removes toner contamination from the rear side of the paper by sending (-) polarity to the transfer roller forcing toner to transfer back to the to OPC drum.
  - Output Voltage : +300V/-150V
  - Error : Smudges and toner contamination on the reverse side of the printed page.

4) Developing Voltage (DEV)
  - Function: It is this voltage that develops toner with on to the section of the OPC drum surface exposed by the LSU
    (Laser Scanning Unit).
  * When printing the exposed voltage on the OPC is -180V, unexposed is -900~-1000V, and the exposing voltage on the DEV is -430V. Therefore toner with (-) polarity is developed onto an exposed section of the OPC.
  - Output voltage: -430V DC ± 20V
  - Error: a) If DEV is GND, print density gets extremely low.
       b) When DEV is floating due to poor connection between the frame and cartridge contacts etc., print density gets extremely high.

5) Supply Voltage (SUP)
  - Function: It is this voltage that supplies toner to the developing roller.
  - Output voltage: : -630V DC ± 50V (Use ZENER, DEV Gear)
  - Error: a) When SUP is GND print density gets extremely low.
       b) If SUP is floating due to poor connection between the frame and cartridge contacts etc. density gets extremely low such that it is hard to see toner with the eyes

6) OPC Ground ZENER Voltage
  - Function: It is this voltage that prevents image contamination under low temperature and low humidity environment conditions.
  - When a set prints without an output voltage, -130V DC ± 15V is maintained on OPC ground. (-103V ZENER diode is connected to OPC ground)
  - Error type: a) When the ZENER diode is - 0V there is no serious image problem in general environment, but in low temperature and low humidity environments it is possible that contamination can occur on the entire image
       b) When the ZENER diode is disconnected a blank page is printed out. (It is the same when a ZENER diode is disconnected from OPC ground.)

2.2.5.2 SMPS (Switching Mode Power Supply)

ItThis is the power source for the whole system. It is an independent module so that it is possible to use it for common use. It is mounted at the bottom of the set.
It consists of the SMPS section, which supplies the DC power to drive the system, and the AC heater control part, which supplies the power to the fuser. The SMPS has four output channels ((+5V, -5V, +12V, +12Vand +24Vs).
There are three kinds of power, 120V exclusive (America), 220V exclusive (Europe), and 220V for China (nations with unstable power supply).

1) AC Input
 - Inputting rated voltage : AC 220V ~ 240V AC 100~127V
 - Inputting voltage fluctuating range : AC 198V ~ 264V AC 90V ~ 135V
 - Rated frequency : 50/60 Hz
 - Frequency fluctuating range : 47 ~ 63 Hz
 - Inputting Current : Under 4.0Arms/2.0Arms

2) Rated Power Output

NO	Item	CH1	CH2	CH3	CH4
1	Channel name	+5V	-5V	+24.0V	+24.0VS
2	CONNECTOR PIN	CON 2 3.3V PIN: 3, 4 GND PIN: 5, 6	CON2 -5V PIN : 7 GND PIN: 8	CON2 24V PIN: 11, 12 GND : 9, 10	CON2 24V PIN: 13, 16 GND : 18
3	Rated outputting voltage	+5V ± 5% (4.75 ~ 5.25V)	-5V ± 5% (-4.75~-5.25V)	+24V ± 10% (21.6 ~ 26.4V)	+24V ± 10% (21.6 ~ 26.4V)
4	Rated outputting current	1.5 A	0.5A	1.5 A	1.0 A
5	Ripple noise voltage	150mVp-p	150mVp-p	500mVp-p	500mVp-p
6	Maximum output	7.5W	0.6W	36.0W	24.0W

3) Consumption Power

NO	Item	CH1 (+5V)	CH2 (+12V)	CH3 (+24V)	CH4 (+24VS)	System
1	Stand-By	1.0 A	0.05A	1.0 A	0.5 A	AVG : 60 Wh : 220V AVG : 75 Wh : 110V
2	Operating	1.5 A	0.5 A	1.5 A	1.0 A	AVG : 320 Wh
3	Sleep-Mode	0.3A	0.0A	0.0A	0.06A	AVG : 15 Wh

4) Length of Power Cord : 1830 ± 50mm

5) Power Switch : Fitted

6) Feature

- Insulating resistance : over 50MΩ (at DC500V)
- Insulating revisiting pressure : Must be no problem within 1min. (at 1500Vzc, 10mA)
- Leaking current : under 3.5mA
- Running current : under 40A peak (at 25°c, Cold start) Under 60A peak (in other conditions)
- Rising Time : Within 2Sec
- Falling Time : Over 20ms
- Surge : Ring Wave 6KV-500A (Normal, Common)

7) Environment Condition

- Operating temperature range : 0°c ~ 40°c
- Storage temperature range : -25°c ~ 85°c
- Storage humidity range : 30% ~ 90% RH
- Operating atmospheric pressure range : 1

8) EMI Requirement : CISPR ,FCC, CE, MIC, C-Tick,

9) Safty Requrement

- IEC950, C-UL, TUV,Semko,iK,CB, CCC, EPA,

2.2.5.3 Fuser AC Power Control

The Fuser (HEAT LAMP) is heated using AC power. The AC power is controlled by a Triac (THY1), a semiconductor switch. 'On/Off control' is achieved when the gate of the Triac is turned on/off by a Photo triac (PC1), this is an insulting part.
In the other words the AC control part is a passive circuit. It turns the heat lamp on/off by taking a signal from the engine control section. When the 'HEATER ON' signal is activated by the engine the LED of PC1 (Photo Triac) flashes. The flashing light causes the Triac (PC1) to switch and a voltage is supplied to the gate of Triac THY1.
As a result AC current flows in the heat lamp, and heat is produced.
On the other hand, when the signal is off, PC1 is off, the voltage is cut off at the gate of Triac THY1, this Triac is therefore off, and thus the heat lamp is turned off.

1) Triac (THY1) feature

- 12A,600V SWITCHING

2) Phototriac Coupler (PC3)

- Turn On If Current : 15mA ~ 50mA(Design: 16mA)
- High Repetive Peak Off State Voltage : Min 600V

2.2.6 Engine F/W

2.2.6.1 Feeding

If feeding from the cassette the drive of the pickup roller is controlled by controlling the pick-up solenoid. The on/off of the solenoid is controlled by controlling the general output port or the external output port. If feeding from the manual feeder the set decides to feed the paper according to the operation of the manual sensor, and by driving the main motor, insert the paper in front of the feed sensor. When paper moves the occurrence of a paper jam is judged as below.

2.2.6.1(a) Jam 0 – Jam in Feed area
・After a page was picked up, paper did not enter the unit due to a paper misfeed.
・After a page was picked up, paper entered but it did not reach the feed sensor in certain time due to slip, etc.
・After a page was picked up, if the feed sensor is not on try to pick up again. After retrying if the feed sensor is still not on after certain time, it is Jam 0.
  - this indicates that the leading edge of the paper doesn't pass the feed sensor within a certain time.
・Even though the paper reaches the feed sensor, the feed sensor does not turn on.
  - this indicates that the leading edge of the paper already passed the feed sensor or that the sensor is fauty.

2.2.6.1(b) Jam 1 – Jam inside the print engine
・After the leading edge of the paper passes the feed sensor, the trailing edge of the paper does not pass the feed sensor within certain time. (During this time the feed sensor cannot be Off)
・After the leading edge of the paper passes the feed sensor, the paper does not reach the exit sensor within certain time. (The exit sensor cannot be On during this time)
  - There is already paper between the feed sensor and the exit sensor.

2.2.6.1(c) Jam 2 – Jam in the Exit area
・After the trailing edge of the paper passes the feed sensor the trailing edge of the paper does not pass the exit sensor within certain time.

2.2.6.2 Drive
The main motor drives the paper feed, developing unit and the Fuser It is driven by software which controls the acceleration, constant speed and deceleration profiles. The Motor is managed with an A3977 driver IC and controlled by step and enable signals from the CPU.

2.2.6.3 Transfer
The charging voltage, developing voltage and the transfer voltage are controlled by PWM (Pulse Width Modulation). Each output voltage is changeable according to the PWM duty cycle. The transfer voltage used when the paper passes the transfer roller is decided by environment recognition. The resistance value of the transfer roller changes due to the surrounding environment in the room or within the set, this change in resistance in turn changes the value of the voltage due to loading. This voltage is fed back into the set through the A/D converter. Based on this fed back value the PWM cycle is changed to maintain the required transfer voltage

2.2.6.4 Fusing

The temperature of the heat roller's surface is detected according to the resistance value of the thermistor. The thermistor resistance is measured using the A/D converter and thus the CPU can determine the temperature of the heat roller. The AC power is controlled by comparing the target temperature to the value from the thermistor. If the value from the thermistor is out of the controlling range while controlling the fusing process, the error stated in the table occurs. (For the domestic model, the Q-PID method has been applied.)

■ **Error Type**

Error	Description
Open heat error	When warming up, it has been lower than 68 °C over 25 sec
Lower heat error	• Standby: It has been lower than 100°C over 25 sec • Printing: - 2 consecutive pages: it has been lower than 145°C over 5 sec - 3 consecutive page; it has been 40°C lower than the fixed fusing temperature over 4 seconds.
Over heat error	It have been higher than 220°C over 3 seconds

2.2.6.5 LSU

The LSU consists of the LD (Laser Diode) and the polygon motor control. When the printing signal occurs, the LD is turned on and the polygon motor is enabled. When the light sensor detects the beam, Hsync occurs. When the polygon motor speed becomes a normal, LReady occurs. If these two conditions are satisfied, the status bit of the LSU controller register becomes 1 ant the LSU is judged to be ready. If the two conditions are not satisfied, the error shown in the table below occurs.

Error	Description
Polygon motor error	When the polygon motor's speed doesn't become a normal
Hsync error	The polygon motor's speed is normal, but the Hsync signal is not created.

2.2.7 OPE PBA

The OPE board consists of various function keys and an LCD to display set status and operator messages. A MICOM (HOLTEC HT48R50) and drives the LEDs and LCD. Communication between the OPE and the CPU on the main board is serial (related signals are /Reset, TXD, and RXD).

3. Disassembly and Reassembly

3.1 General Precautions on Disassembly

When you disassemble and reassemble components, you must use extreme caution. The close proximity of cables to moving parts makes proper routing a must.
If components are removed, any cables disturbed by the procedure must be restored as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.

Whenever servicing the machine, you must perform as follows:

1. Check to verify that documents are not stored in memory.

2. Be sure to remove the toner cartridge before you disassemble parts.

3. Unplug the power cord.

4. Use a flat and clean surface.

5. Replace only with authorized components.

6. Do not force plastic-material components.

7. Make sure all components are in their proper position.

Releasing Plastic Latches

Many of the parts are held in place with plastic latches. The latches break easily; release them carefully.
To remove such parts, press the hook end of the latch away from the part to which it is latched.
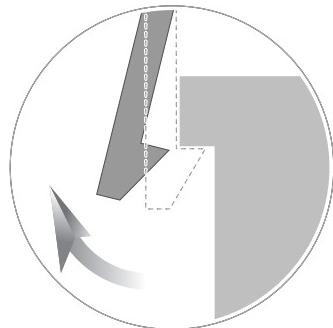
3.2 White Roller Ass,y

1. Open the OPE Unit.
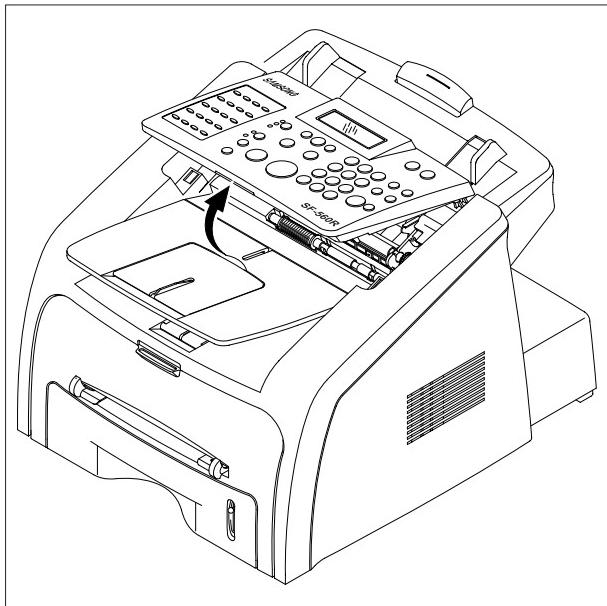
2. Push the Bushing on RH end of the roller slightly inward, then rotate it until it reaches the slot as shown below. Then lift the roller out.
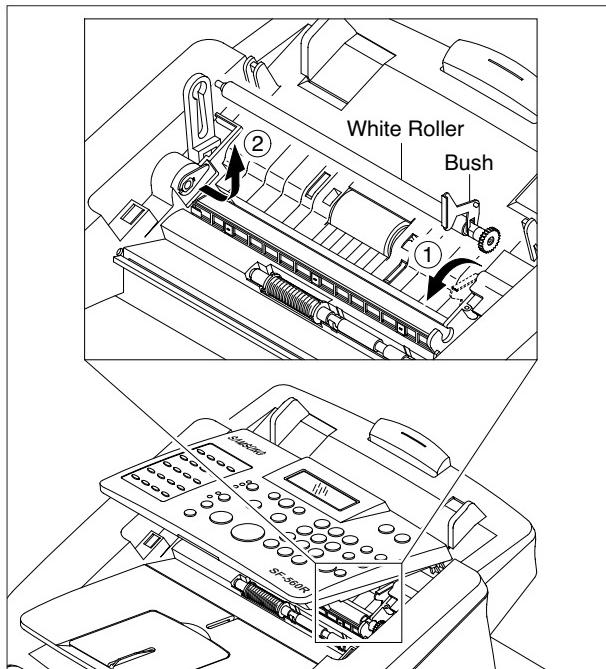
Note: Check the roller for any dirt. Clean with a soft cloth dampened with water.
If the roller is heavily worn replace it with a new one.

3.3 Rear Cover

1. Remove the four screws securing the Rear Cover and remove it, as shown below.
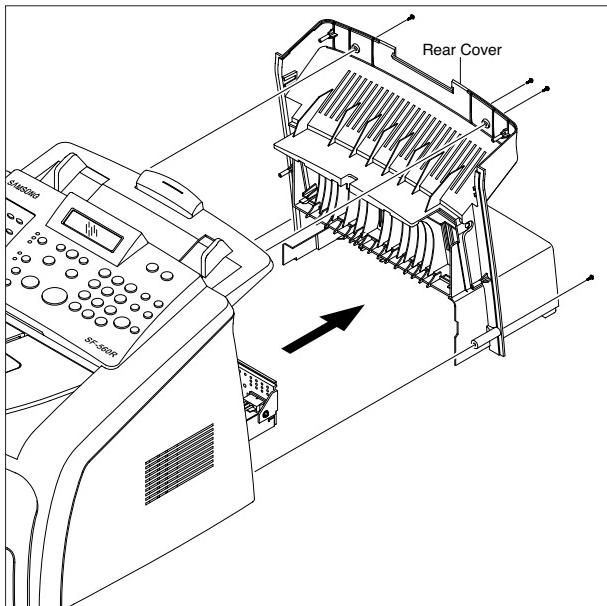
2. Unlatch the Face up Cover Securing the Rear Cover, as shown below. Then lift the Face up Cover out.
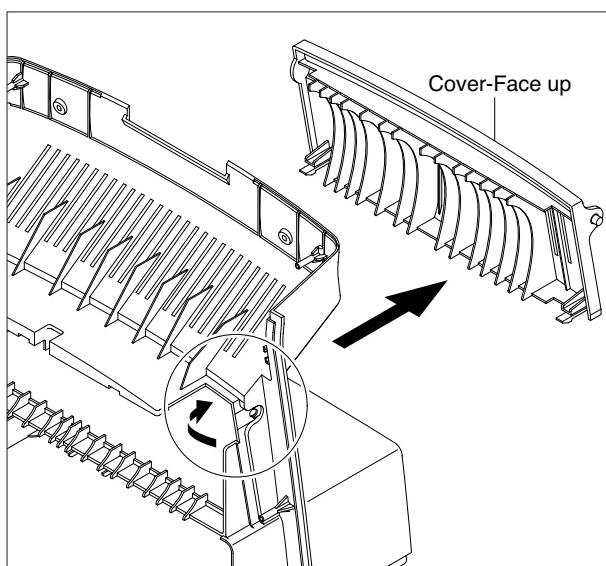
3.4 Side Cover L

1. Before you remove the Side Cover L, you should remove:
   - Remove handset and cradle.

2. Release the latches from Frame Ass,y in the direction of the arrow, as shown below. Take care to disconnect speaker harness.
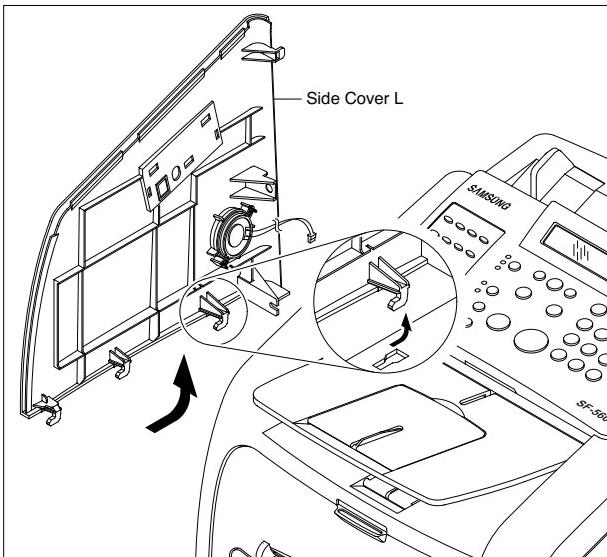
3. If necessary, remove the two screws securing the Speaker and remove it.
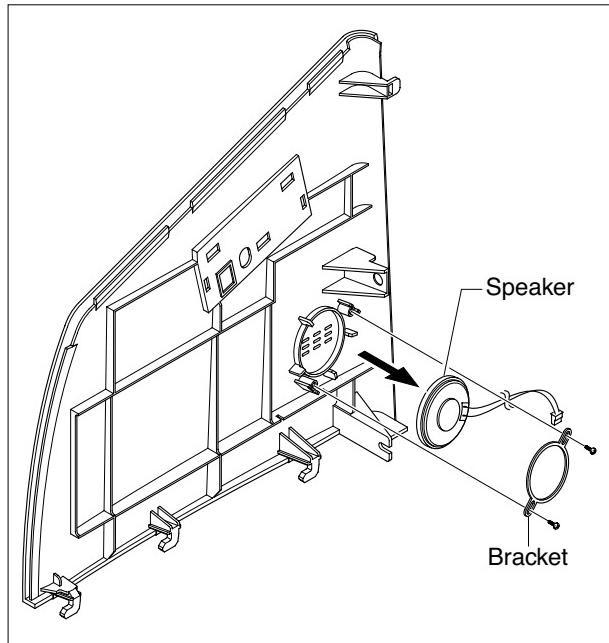
3.5 Side Cover R

1. Before you remove the Side Cover R, you should remove:
   - Rear Cover (see section 3.3)

2. Release the latches from Frame Ass'y in the direction of the arrow, as shown below.
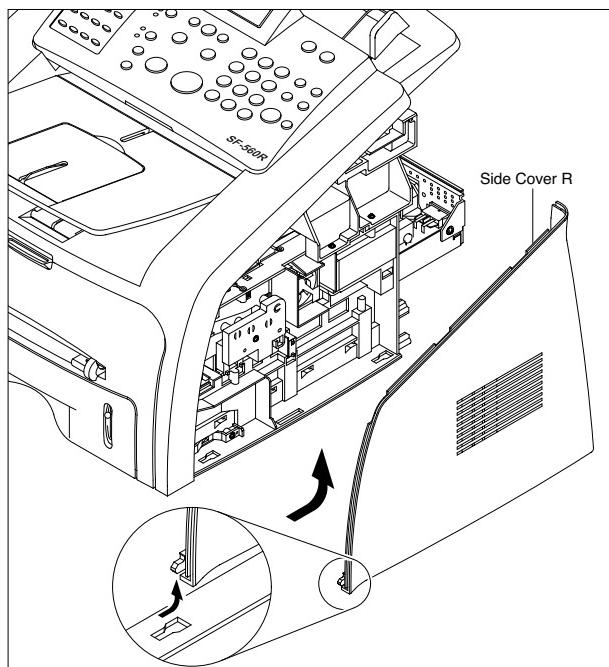
3.6 OPE Unit

1. Before you remove the OPE Unit, you should remove:
   - Rear Cover (see section 3.3)

2. Unplug the OPE connector from the Main PBA and Scan Motor Harness, as shown below.
   Then remove the two screws securing the Ground Cable and remove it. Note the position of the bronze earth plate.
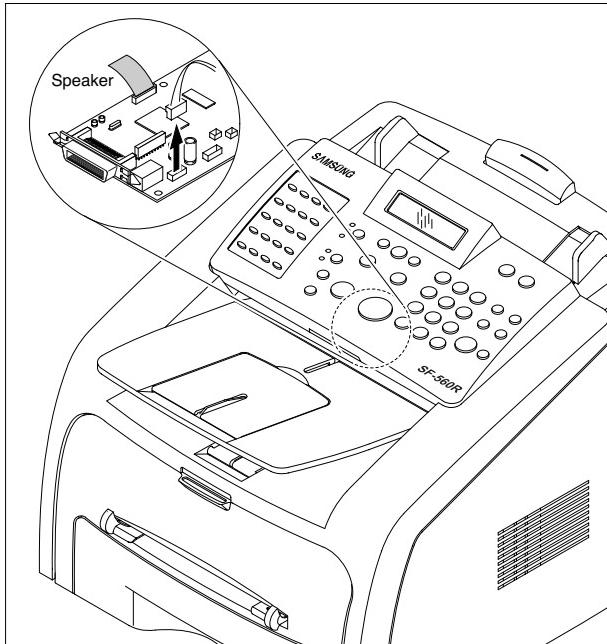
3. Open the OPE and release the latch from Holder, as shown below.
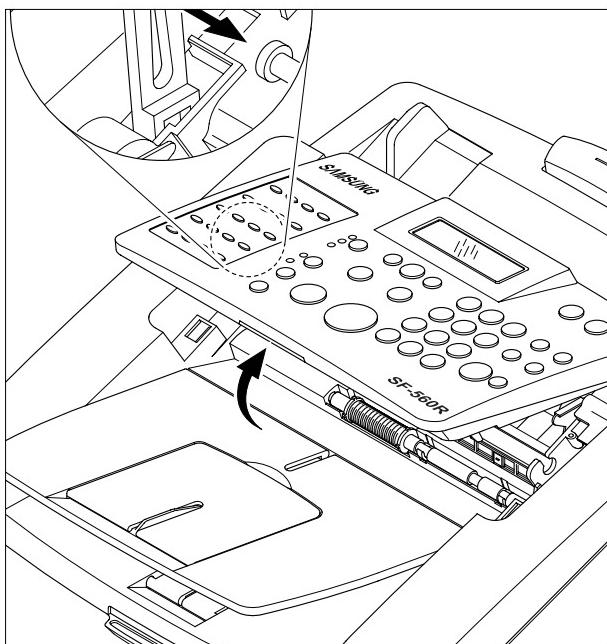
4. Carefully release the latches from Top Cover in the direction of the arrow, as shown below.
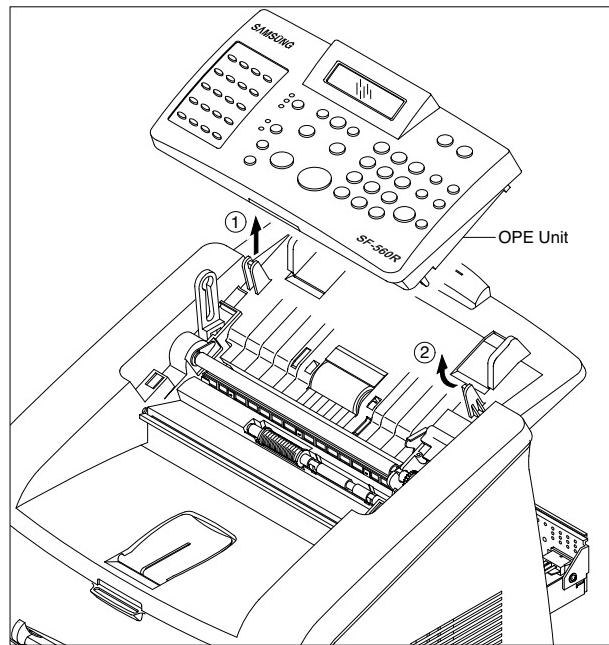
5. Remove the two screws securing the Scan Upper Ass'y and remove it.
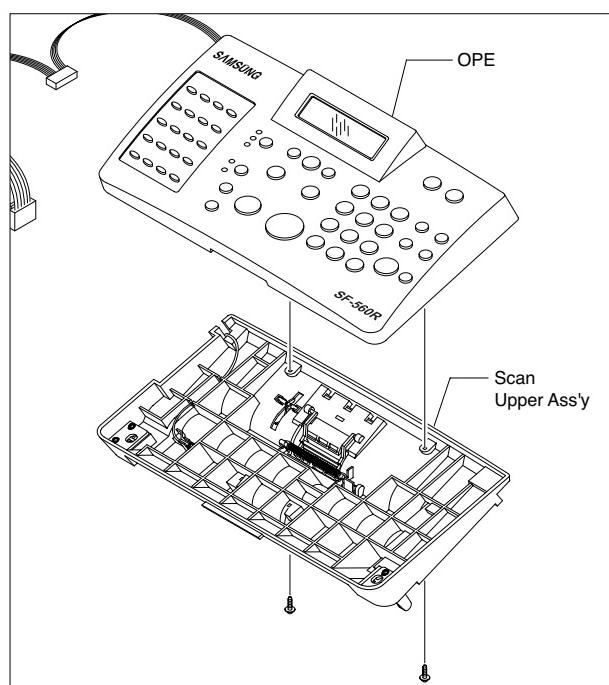
6. Remove the seven screws securing the OPE PBA and remove it.

OPE PBA
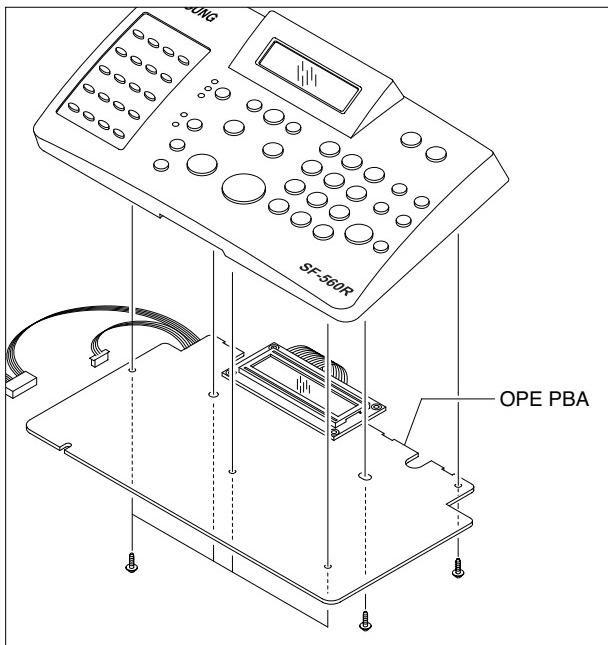
8. Remove the Key Pad from the OPE Cover.

Key Pad
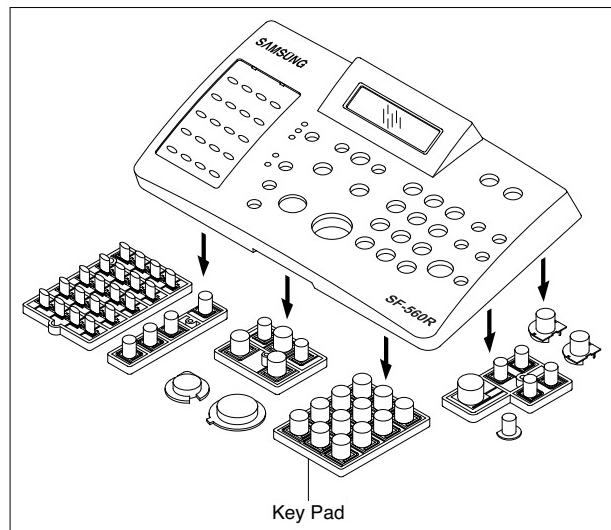
7. Remove the Contact Rubber from the OPE Cover.

Contact Rubber
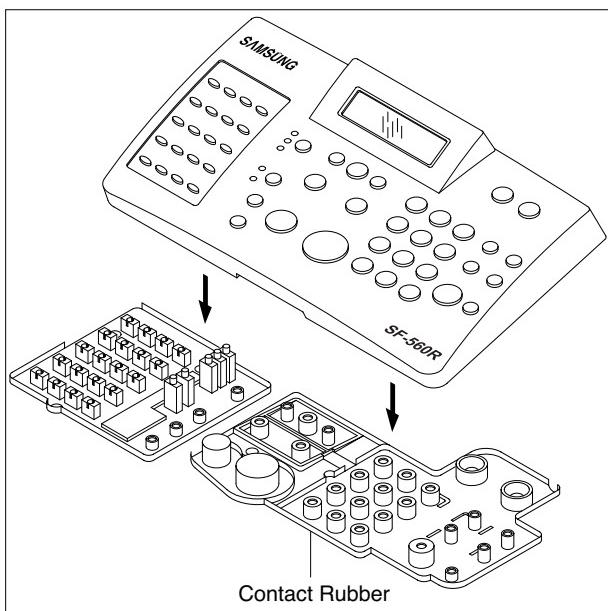
3.7 ADF Rubber Pad

1. Before you remove the ADF Rubber Pad, you should remove:
   - Rear Cover (see section 3.3)
   - OPE Unit (see section 3.6)

2. Insert a flat-blade screwdriver into the slot as shown below, and release the latches.
   Take out the Rubber Holder and the Rubber Pad.

Rubber Pad
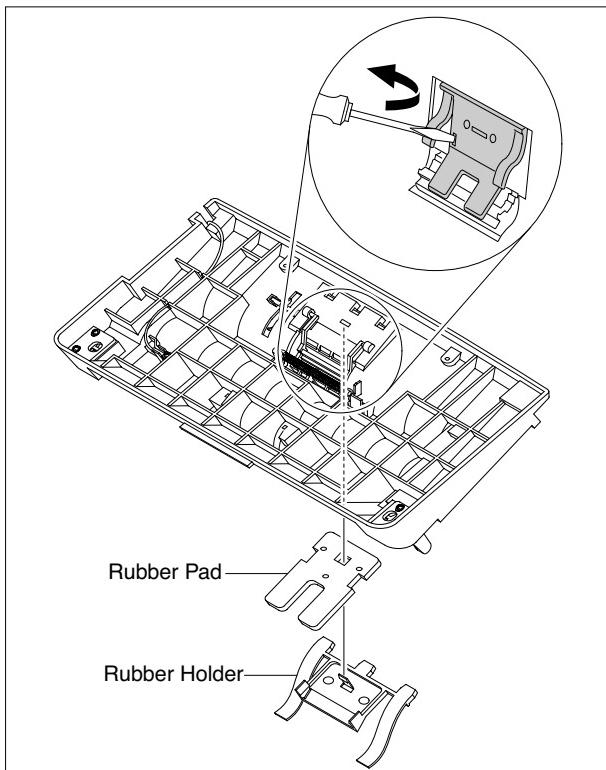
Rubber Holder

Note:
 • When you reassemble the Rubber Pad, be sure that the Rubber Pad and Holder fit into the Guide Boss and the Holder latches fit into the corresponding holes. Then push firmly until it clicks.

 • Clean the surface of the Rubber Pad with ethyl alcohol. After wiping it, be sure to dry it. Check the rubber for wear. If the wear reaches 1/2 it's original thickness, replace it with a new one.

3.8 CIS

1. Before you remove the CIS, you should remove:
   - White Roller Ass'y (see section 3.2)
   - Rear Cover (see section 3.3)

2. Unplug the CIS connector from the Main PBA. (CN14)
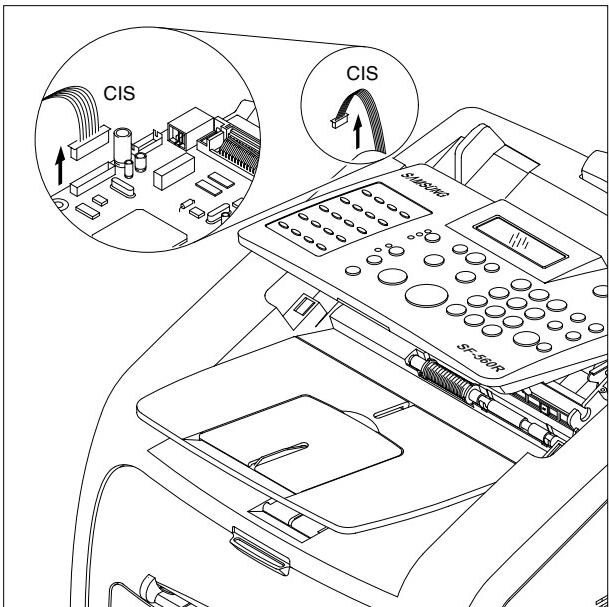
3. Unlatch the CIS using a flat-blade screwdriver and release it, as shown below. Disconnect harness from CIS unit.
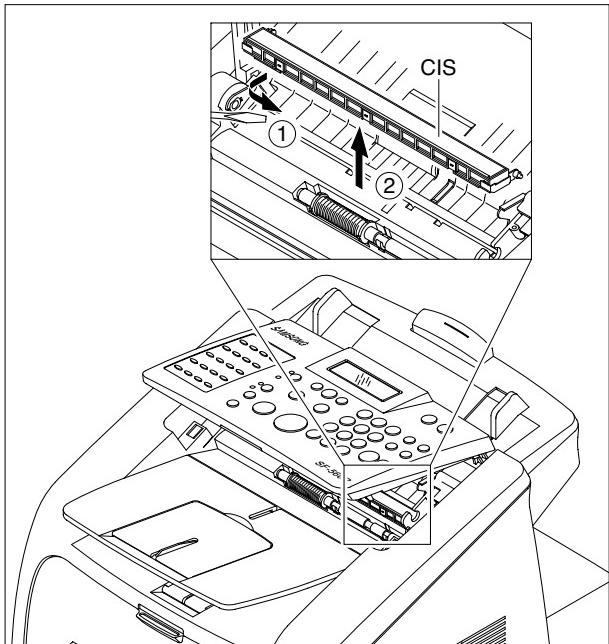
3.9 Exit Roller

1. Open the OPE Unit.
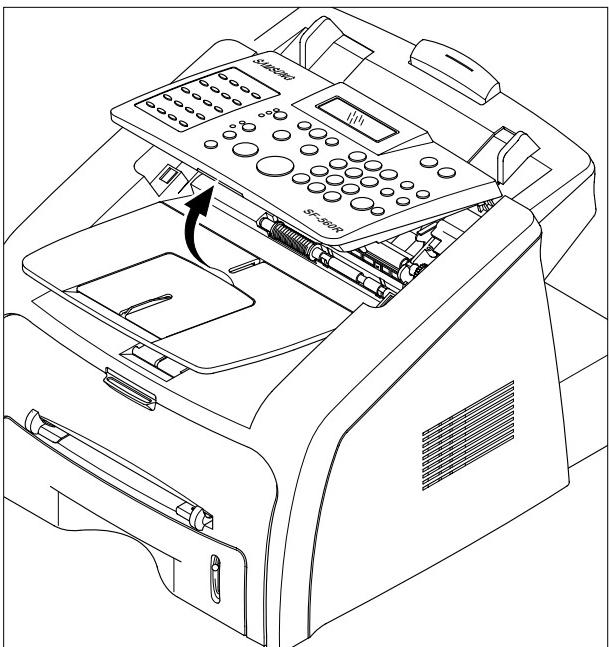
2. Pull up the Exit Roller using a flat-blade screwdriver and remove it, as shown below.
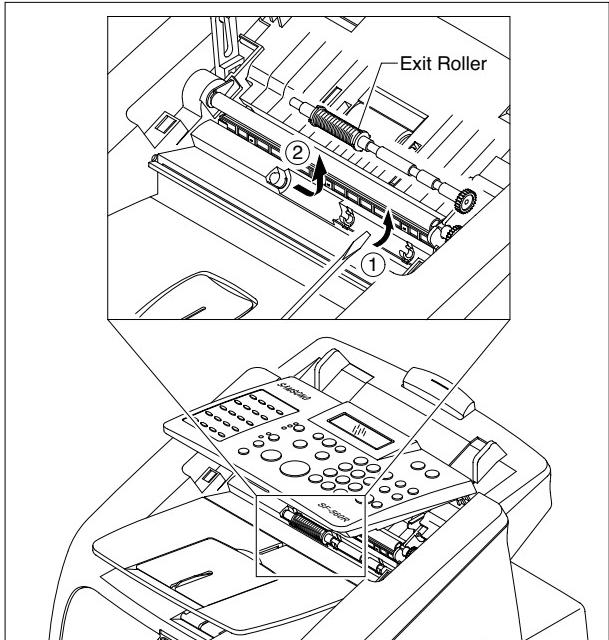
3.10 Front Cover Ass'y

1. Take out the Cassette.

Cassette

2. Open the Front Cover.
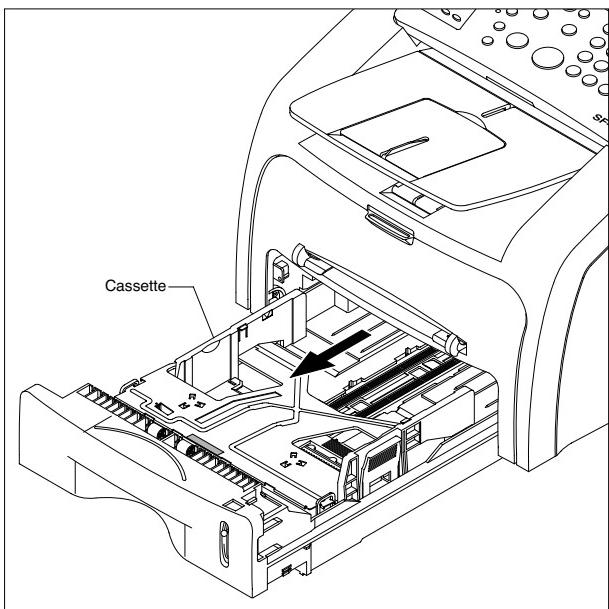
3. Unlatch the Front Cover from the Frame Ass'y. Then remove the Front Cover, as shown below.
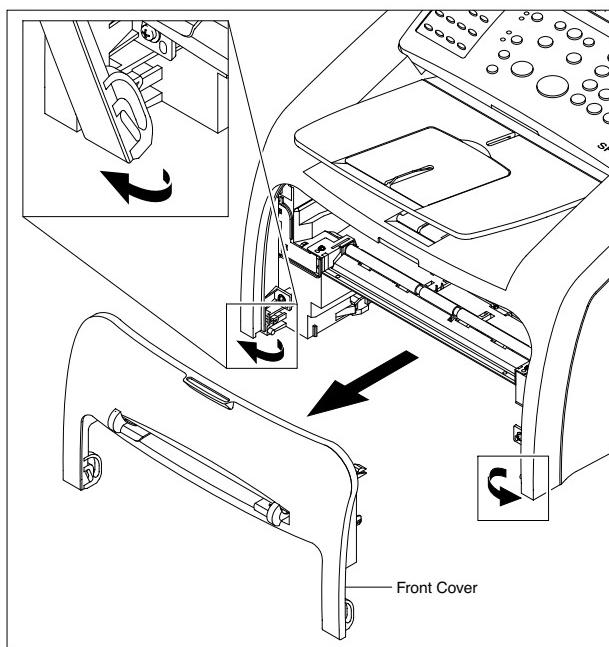
Front Cover

3.11 Scan Ass'y

1. Before you remove the Scan Ass'y, you should
   remove:
   - Rear Cover (see section 3.3)
   - Side Cover L (see section 3.4)
   - Side Cover R (see section 3.5)
   - Front Cover (see section 3.10)

2. Unplug the three connectors (OPE, CIS, scan motor)
   from the Main PBA. Then remove the two Ground
   Cables, as shown below.
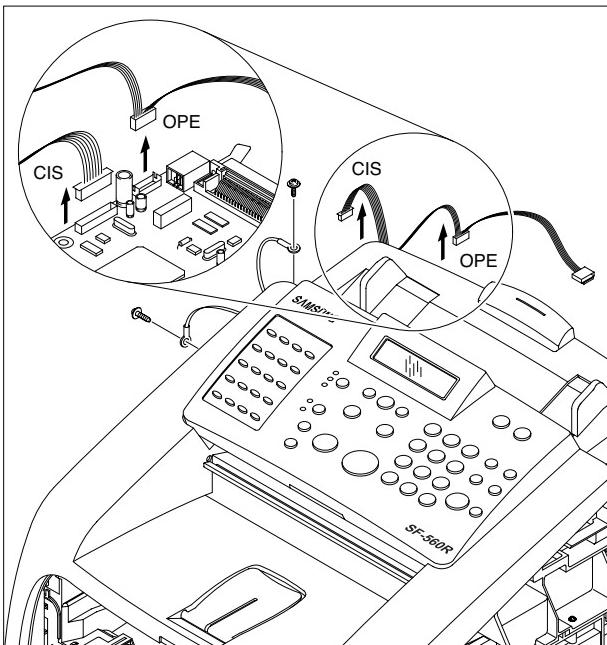
3. Remove the four screws securing the Top Cover and
   remove the Scan Ass'y, as shown below.
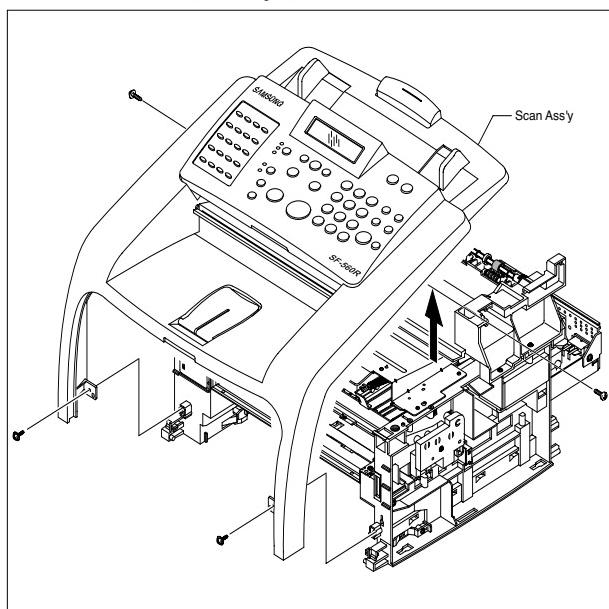
3.12 Scan Motor Ass'y

1. Before you remove the Scan Motor Ass'y, you should remove:
   - Rear Cover (see section 3.3)
   - Side Cover L (see section 3.4)
   - Side Cover R (see section 3.5)
   - OPE Unit (see section 3.6)
   - Front Cover (see section 3.10)
   - Scan Ass'y (see section 3.11)

2. Open the OPE Unit.
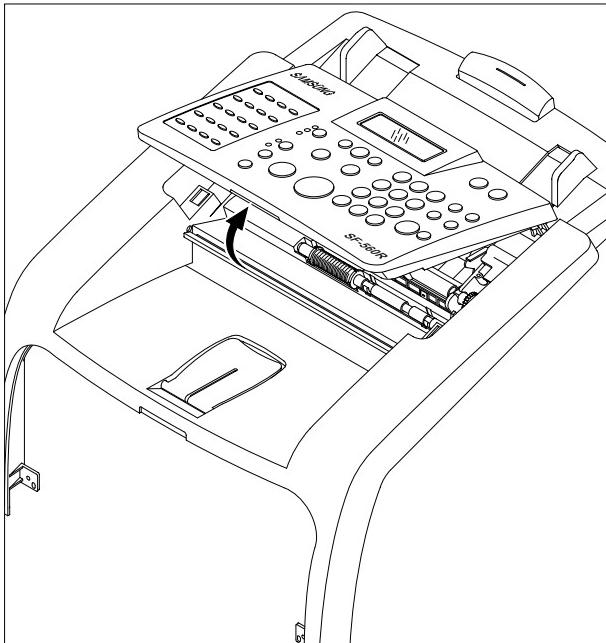
3. Remove the three silver screws securing the Scan Motor Ass'y and remove it.
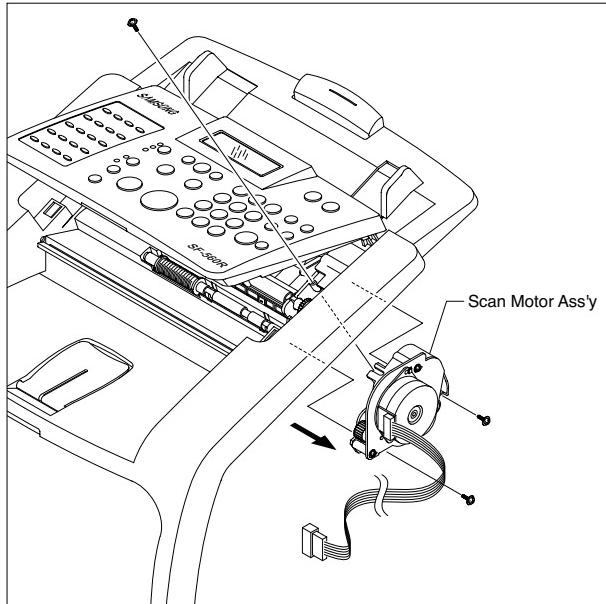
4. If necessary, remove the one screw securing the Scan Motor and release the latches from Motor Bracket in the direction of the arrow, as shown below.
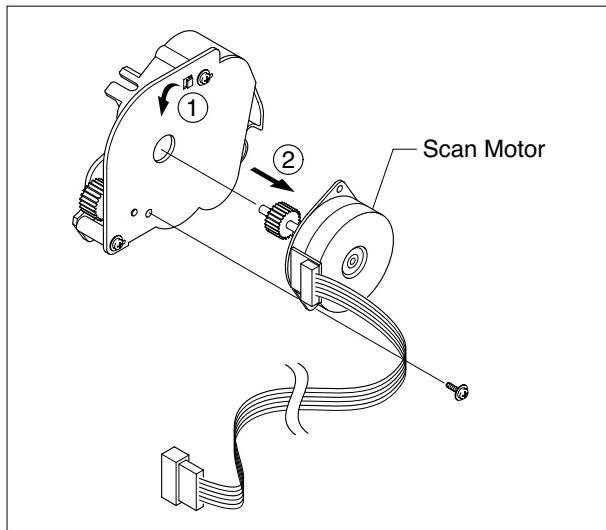
3.13 ADF Roller

1. Before you remove the ADF Roller, you should remove:
   - Rear Cover (see section 3.3)
   - Side Cover L (see section 3.4)
   - Side Cover R (see section 3.5)
   - Front Cover (see section 3.10)
   - Scan Ass'y (see section 3.11)
   - Scan Motor Ass'y (see chapter 3.12)

2. Carefully release the ADF Gear from the ADF Roller, as shown below.

ADF Gear
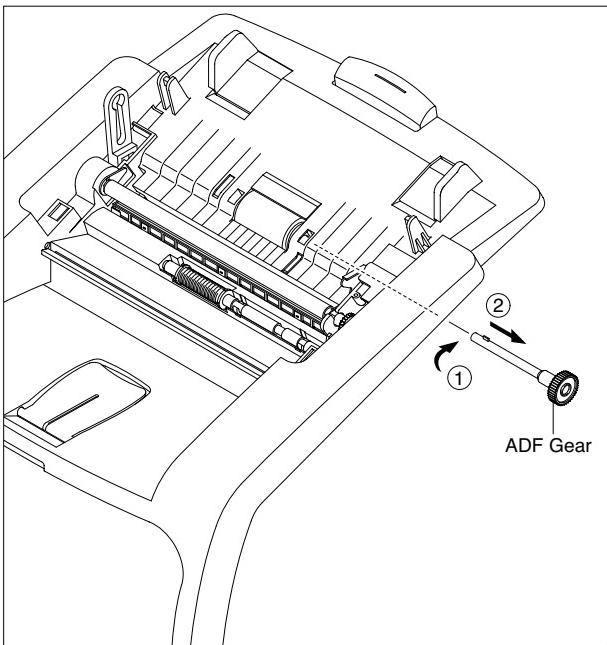
3. Carefully release the ADF Roller from Top Cover in the direction of the arrow, as shown below.

ADF Roller
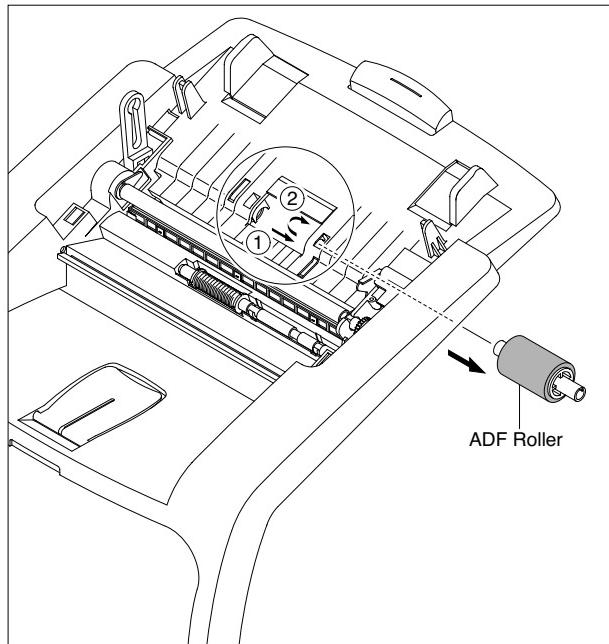
3.14 Sub Hook PBA

1. Before you remove the Sub Hook PBA, you should remove:
   - Rear Cover (see section 3.3)
   - Side Cover L (see section 3.4)

2. Unplug the one connector from the Sub Hook PBA, as shown below.
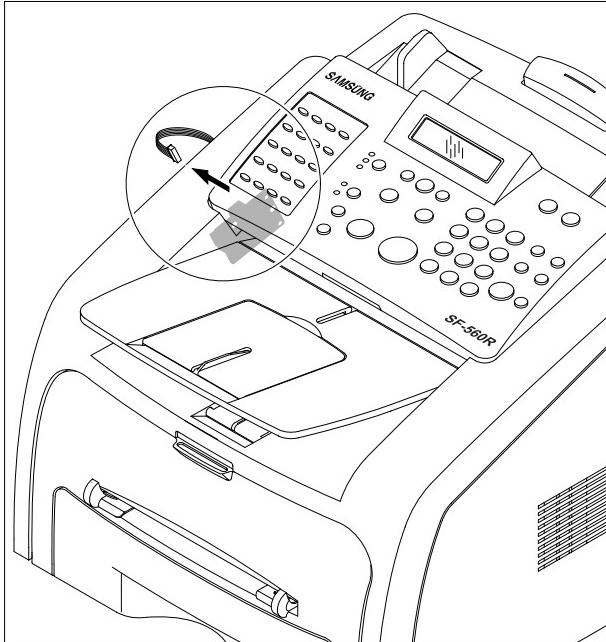
3. Remove the one screws securing the Sub Hook PBA and remove it.
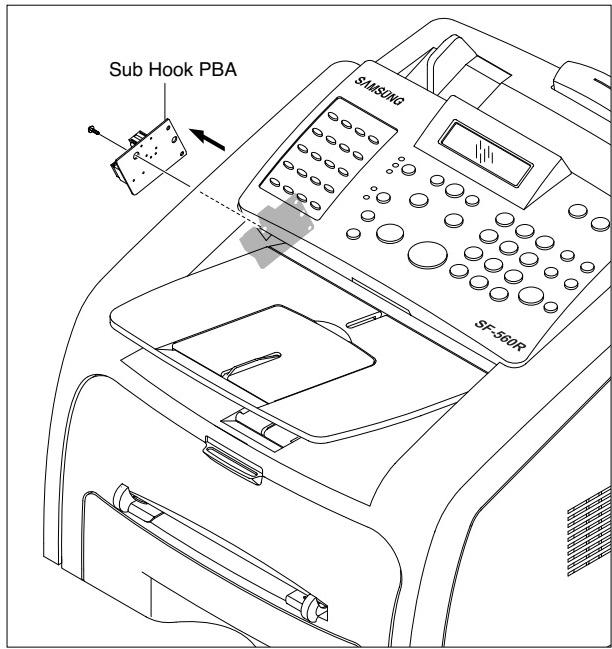
3.15 Drive Ass'y

1. Before you remove the Drive Ass'y, you should remove:
   - Rear Cover (see section 3.3)
   - Side Cover L (see section 3.4)

Note : When re-fitting the Drive Ass'y tighten the screws in the order that they are numbered on the base plate.

2. Remove the six screws securing the Drive Ass'y and remove it. Then unplug the one connector from the Drive Motor, as shown below.
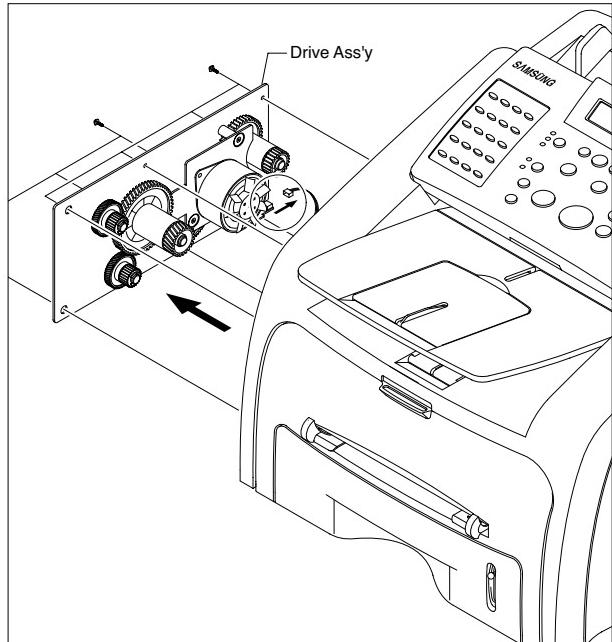
3.16 DC-Fan

1. Before you remove the Fan, you should remove:
   - Rear Cover (see section 3.3)
   - Side Cover R (see section 3.5)

2. Unplug the one connector from the SMPS, as shown below. Then take out the Fan.
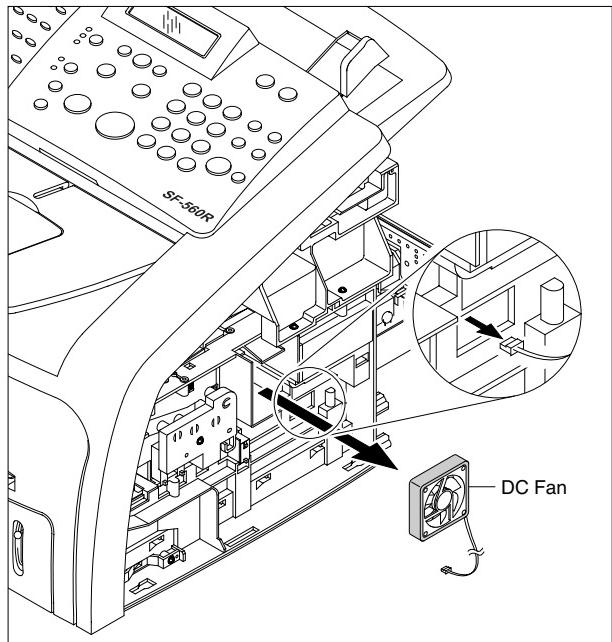
3.17 Exit Cover Ass'y

1. Before you remove the Exit Cover Ass'y, you should remove:
   - Scan Ass'y (see section 3.11)
   - Sub High PBA (see section 3.14)

2. Remove the four screws securing the Exit Cover Ass'y and remove it, as shown below.
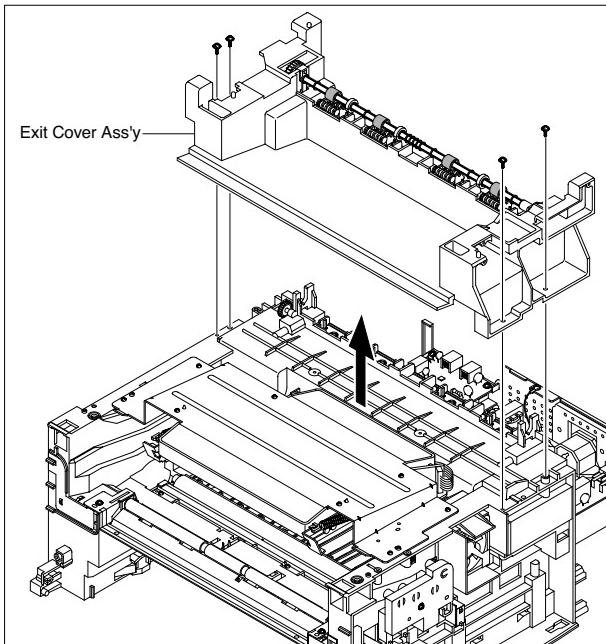
3. Remove the Exit Gear and Bearing using a flat-blade screwdriver, as shown below.
   Then take out the Exit Roller.
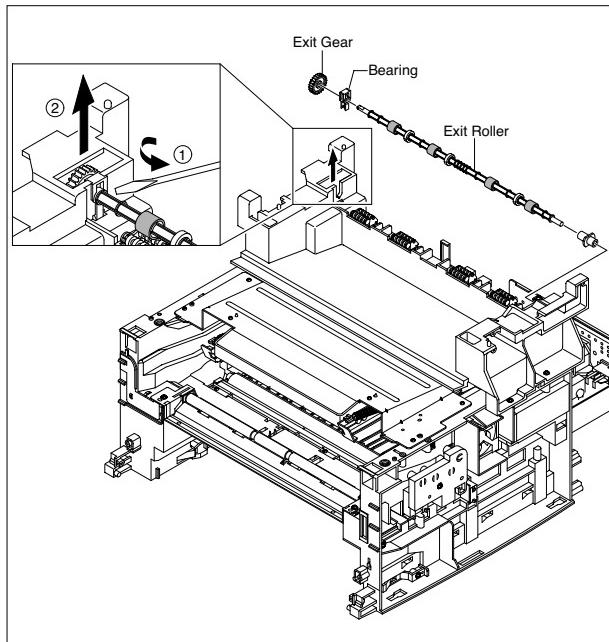
3.18 LSU-Unit

1. Before you remove the LSU, you should remove:
   - Scan Ass'y (see section 3.11)

2. Unplug the two connectors from the LSU, as shown below.
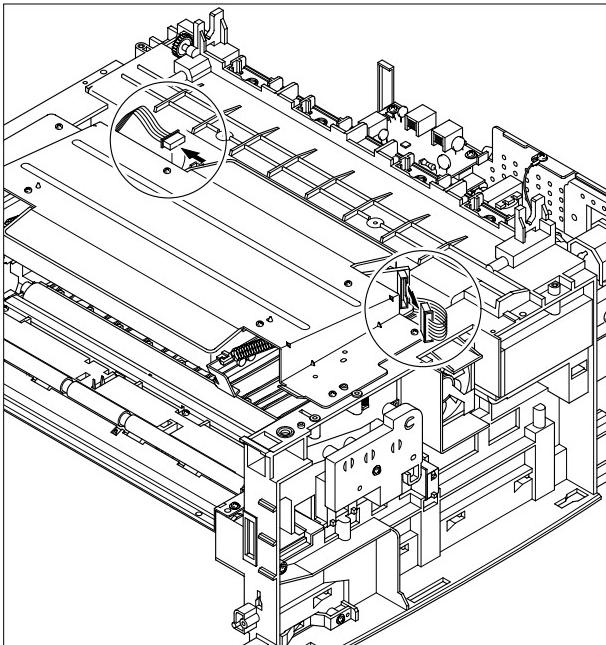
3. Remove the four screws securing the LSU and remove it.
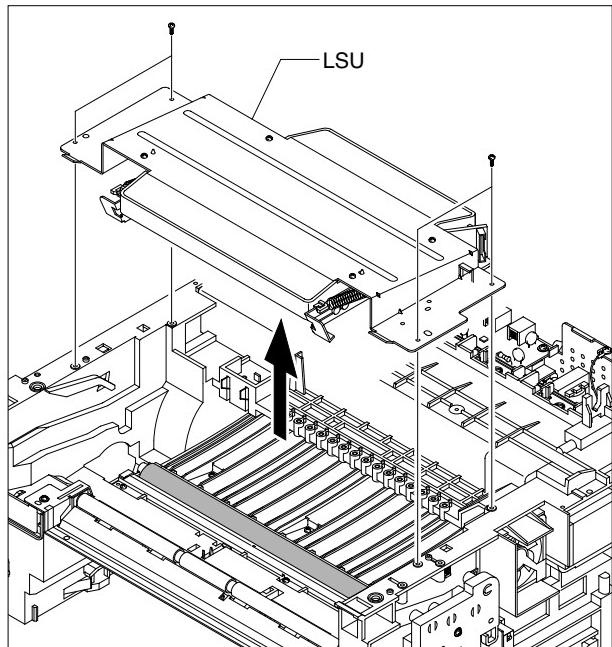
3.19 Engine Shield Ass'y

1. Before you remove the Engine Shield Ass'y, you should remove:
   - Rear Cover (see section 3.3)
   - Side Cover L (see section 3.4)
   - Side Cover R (see section 3.5)

2. Remove the twelve screws securing the Engine Shield Ass'y and remove it. Then unplug the all connectors from the SMPS and Main PBA, Main High PBA.
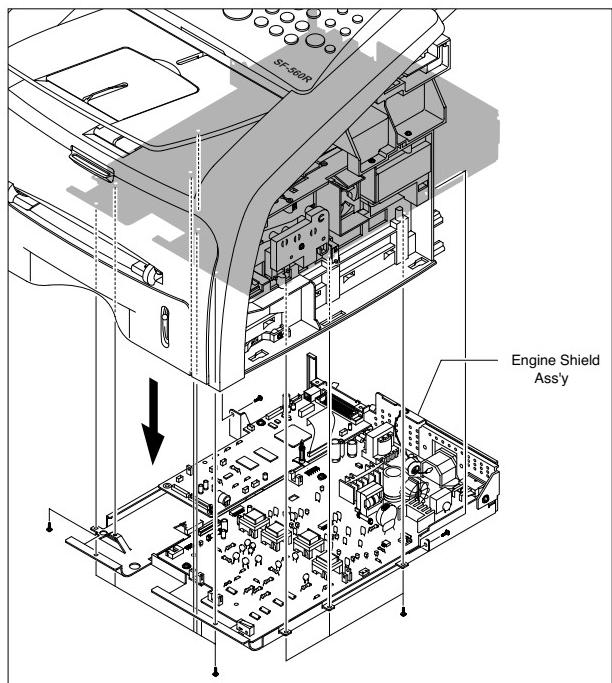
3.20 Main PBA

1. Before you remove the Main PBA, you should remove:
   - Engine Shield Ass,y (see section 3.19)

2. Remove the three screws securing the Main PBA and remove it. Then carefully release the latches from Supporter, as shown below.
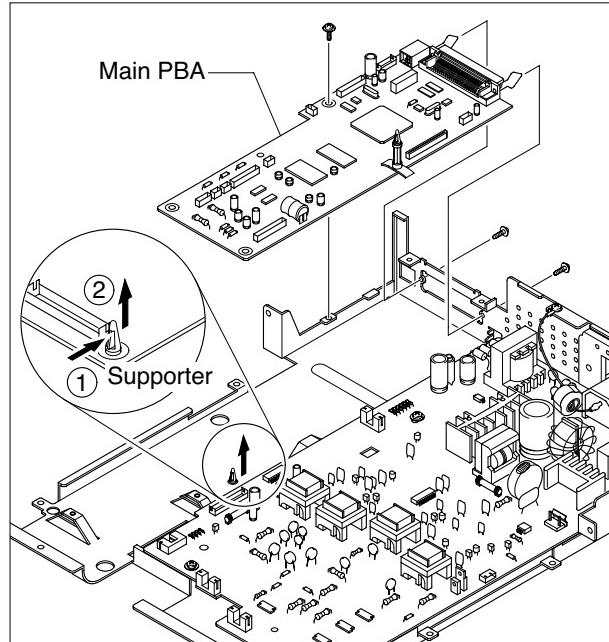
3.21 SMPS

1. Before you remove the SMPS, you should remove:
   - Engine Shield Ass,y (see section 3.19)

2. Remove the three screws securing the Inlet Bracket and remove it.
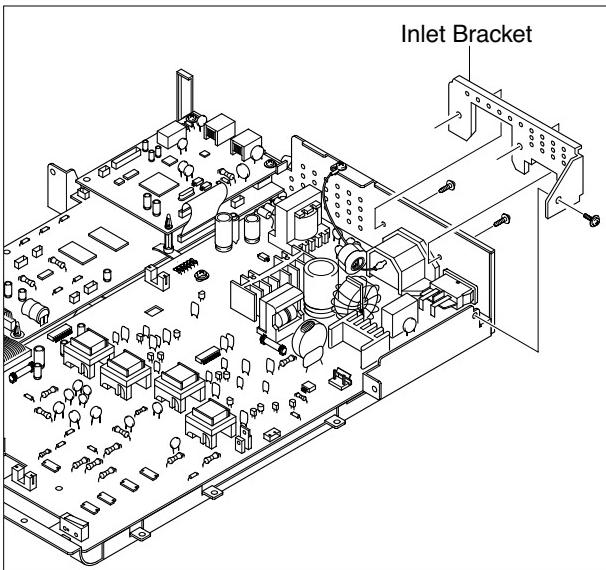
3. Unplug one connector.

4. Remove the four screws securing the SMPS and remove it. Then Lift the SMPS out, as shown below.
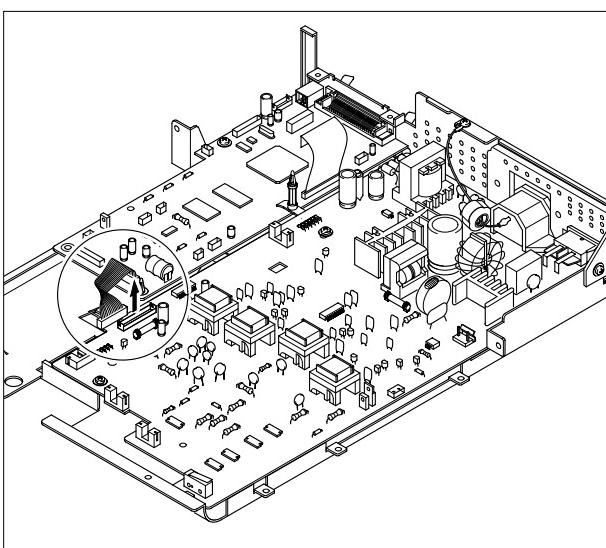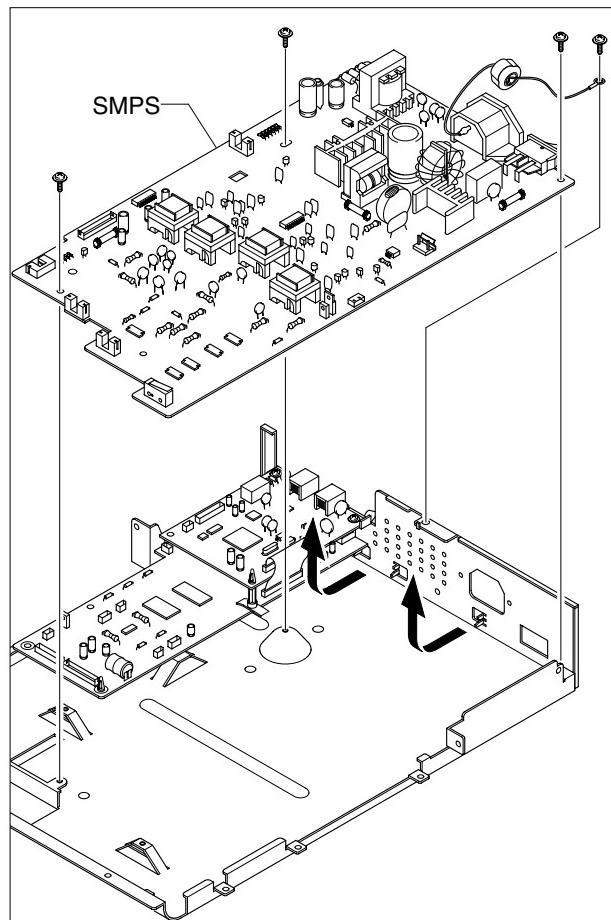
3.22 Fuser Ass'y

1. Before you remove the Fuser Ass'y, you should remove:
   - Engine Shield Ass,y (see section 3.19)

2. Unplug the two connectors from the Main PBA and SMPS, as shown below. Then remove the four screws securing the Fuser Ass'y and remove it.

Fuser Ass'y
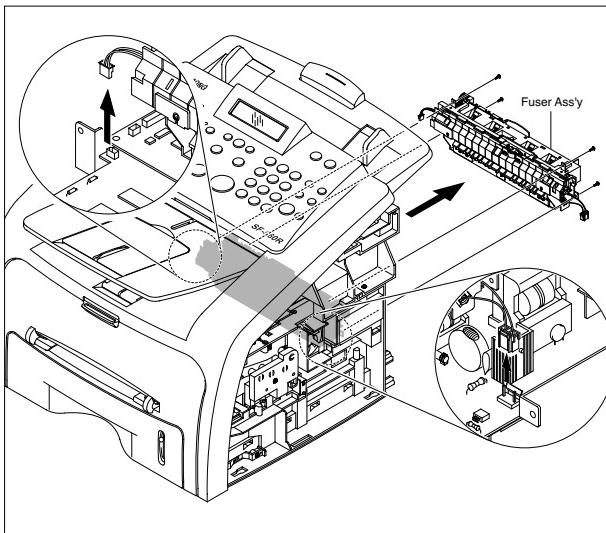
3. Remove the two screws securing the Thermostat. Then lift the Thermostat out.

Thermostat
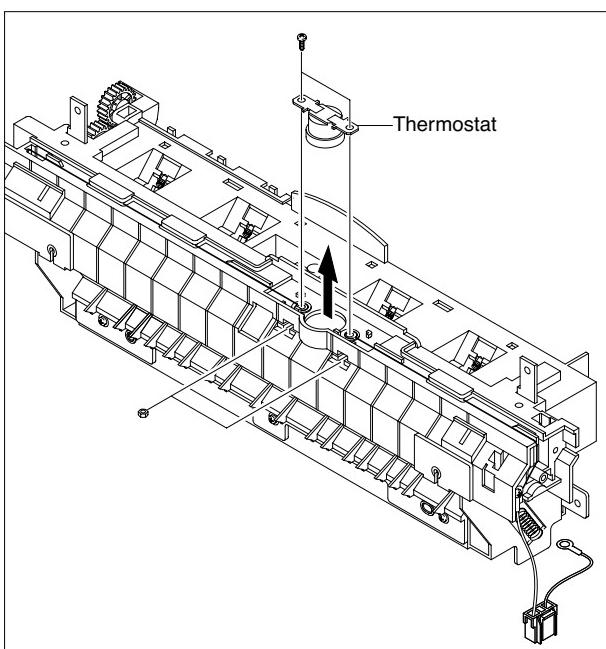
4. Remove the two screws securing the Halogen Lamp. Then take out the Halogen Lamp from the Heat Roller, as shown below.

Heat Roller

Halogen Lamp
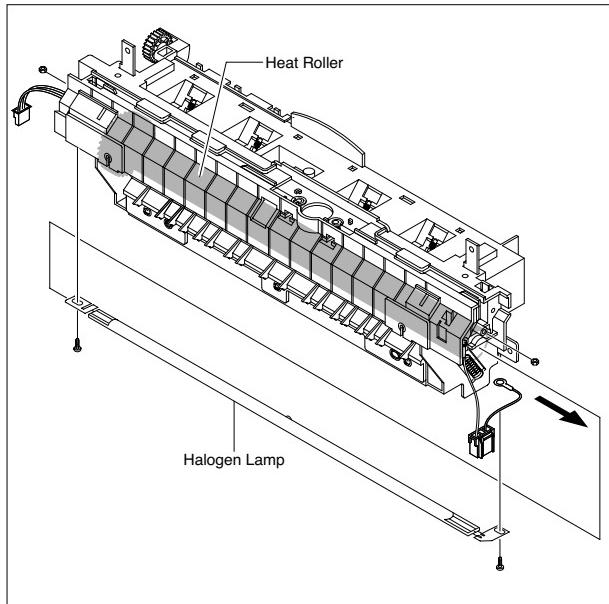
5. Remove one screw securing the Idle Gear and remove it.

Idle Gear
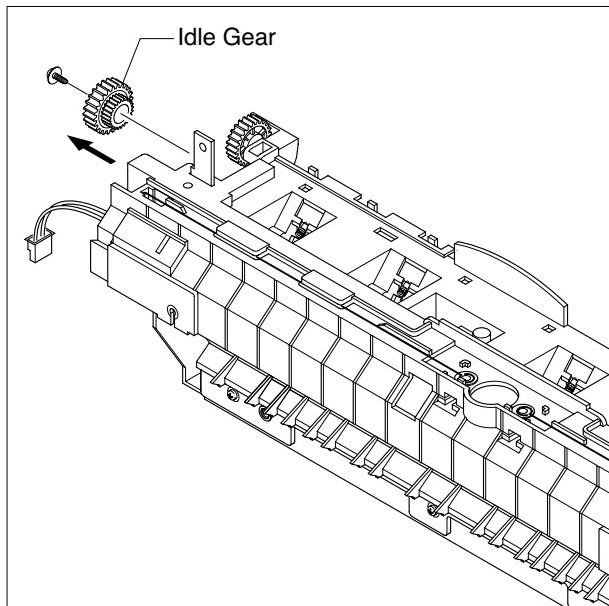
6. Remove the four screws securing the Fuser Cover and remove it, as shown below.

7. Unwrap the Thermister Harness, as shown below.

8. Remove the one screw securing the Thermister and remove it,   as shown below.
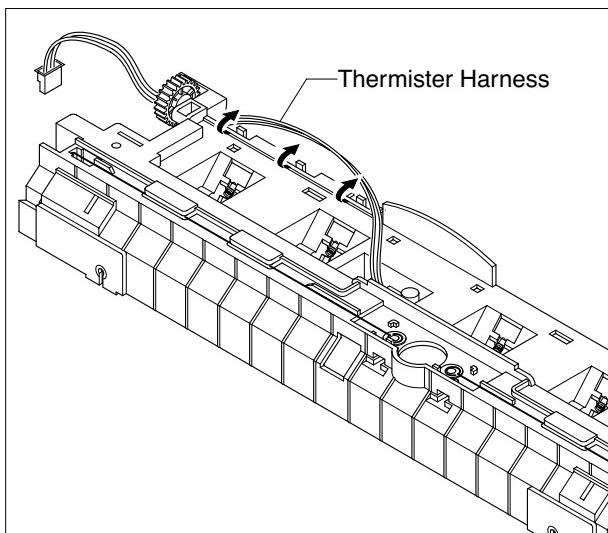
3.23 Transfer Ass'y

1. Before you remove the Transfer Ass'y, you should remove:
   - LSU (see section 3.18)

2. Remove the three screws securing the Transfer Earth and remove it.
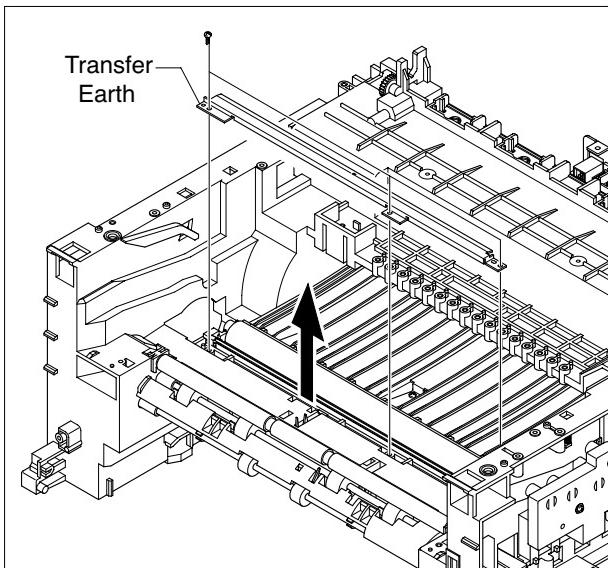
3. Unplug the PTL Holder connector, then remove the PTL Holder and PTL Lens, as shown below.
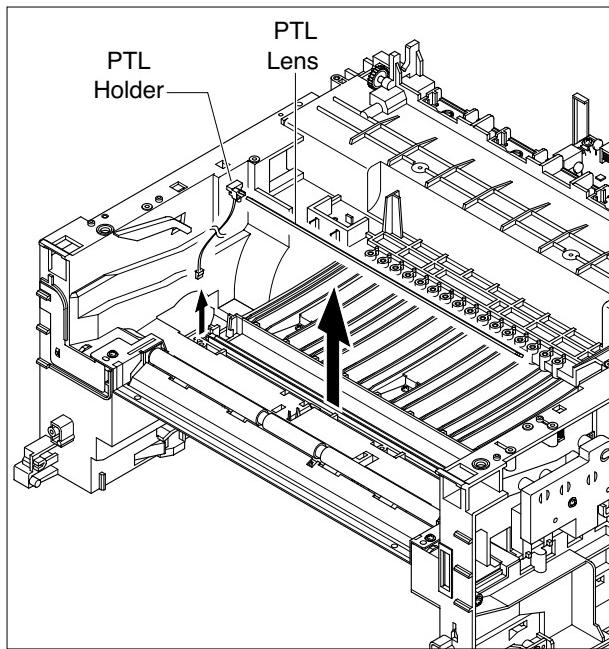
4. Release the frame latch at the R side of the Transfer roller and lift the roller out. Release the latch on each bush and lift them out.
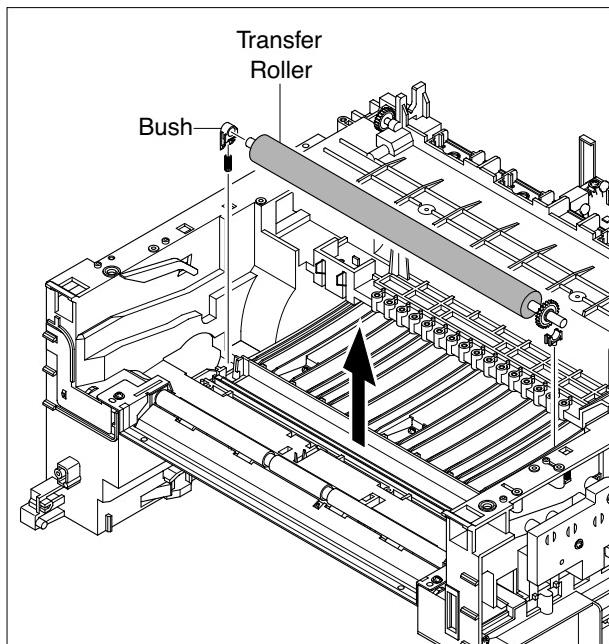
3.24 Feed Ass'y

1. Before you remove the Feed Ass'y, you should remove:
   - Scan Ass'y (see section 3.11)
   - Drive Ass'y (see section 3.15)
   - LSU (see section 3.18)

2. Remove the two screws securing the Paper Guide and remove it.
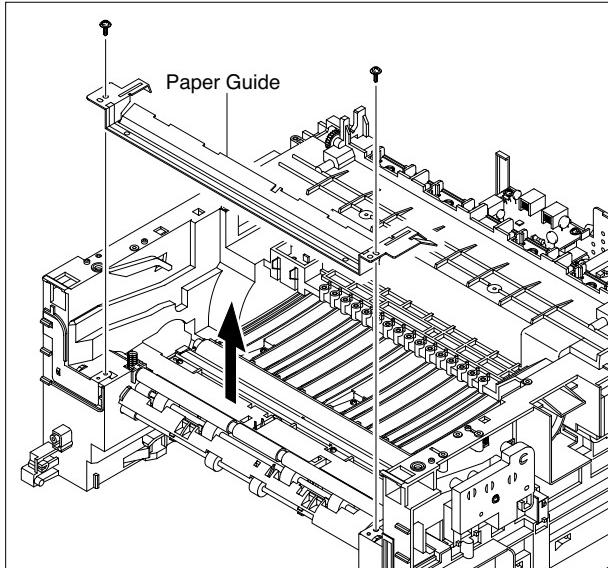
3. Pull up the Feed Idle Bush and Feed Idle Shaft, as shown below.
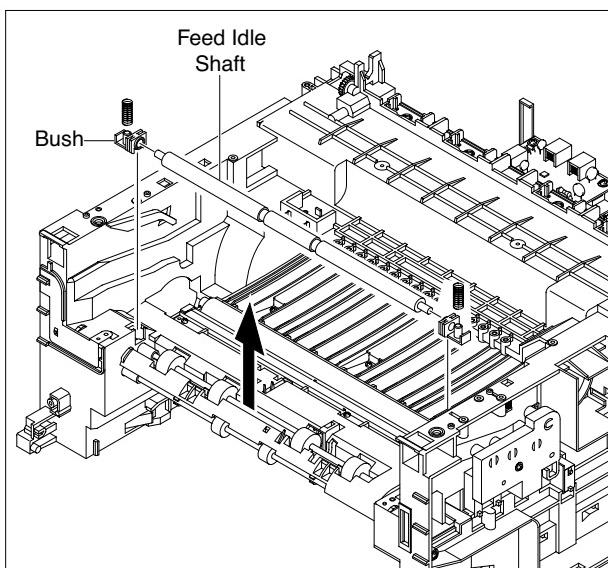
4. Remove the three screws securing the Feed Bracket and remove it.
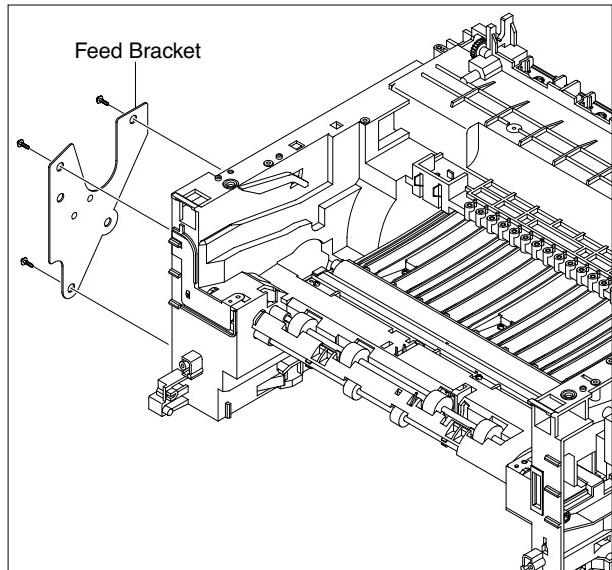
5. Remove the Idle Gear and Feed Gear2.
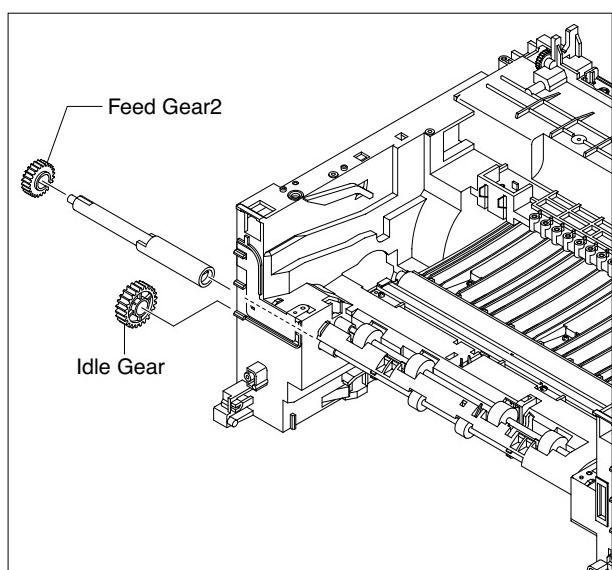
6. Remove the Feed Gear1 Ass'y.

Feed Gear1
Ass'y
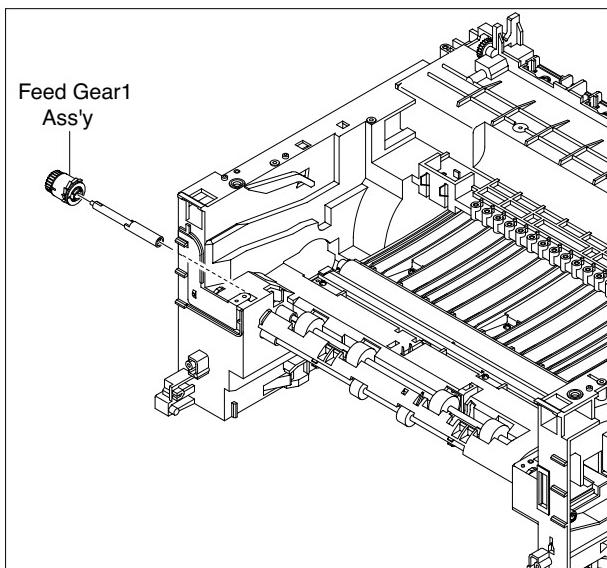
7. Pull up the Feed Roller and Feed Roller1.

Feed Roller

Feed Roller1
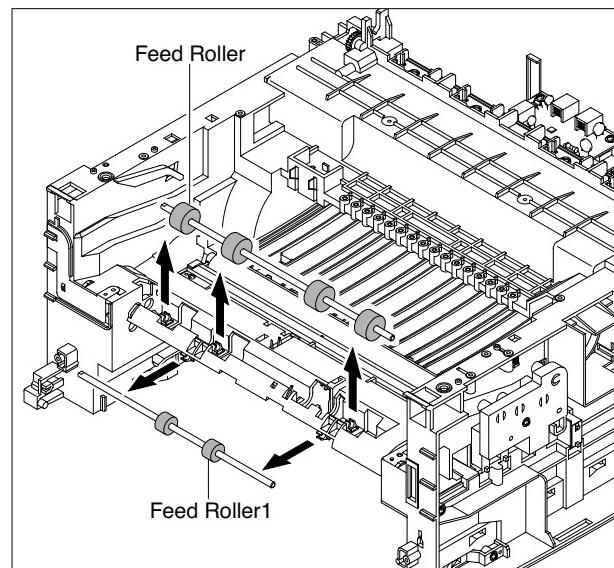
3.25 Pick up Ass'y

1. Before you remove the Pick up Ass'y, you should remove:
   - Scan Ass'y (see section 3.11)
   - Drive Ass'y (see section 3.15)
   - LSU (see section 3.18)
   - Engine Shield Ass,y (see section 3.19)

2. Remove the Pick up Gear Ass,y.

Pick up Gear Ass'y
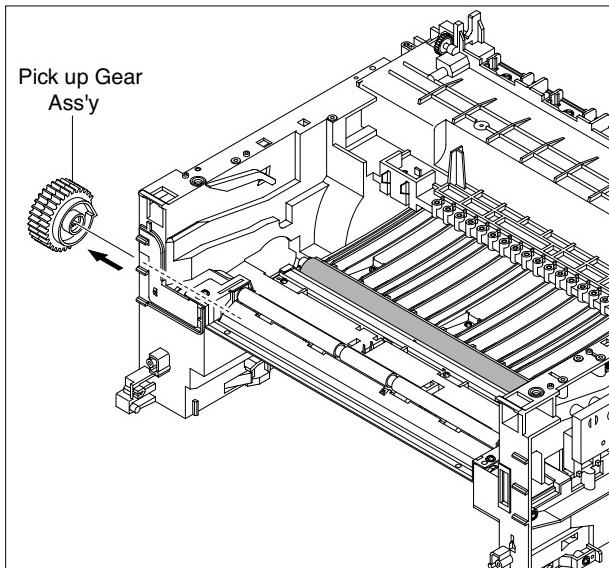
3. Take out the Pick up Ass'y, as shown below.

Bush
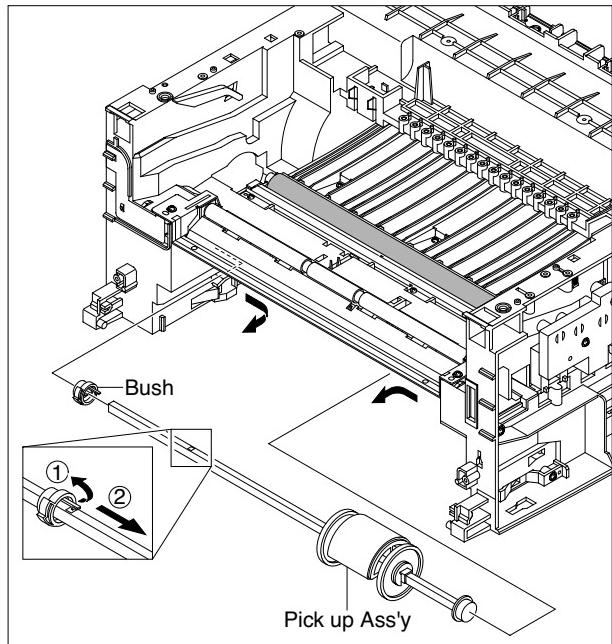
Pick up Ass'y

3.26 Solenoid

1. Before you remove the Solenoid, you should remove:
   - Scan Ass'y (see section 3.11)
   - Feed Ass'y (see section 3.25)
   - Pick up Ass'y (see section 3.26)

2. Remove the two screws securing the Manual Solenoid and Pick up Solenoid.
   Then remove Manual Solenoid and Pick up Solenoid.

(Pick up) Solenoid

(Manual) Solenoid
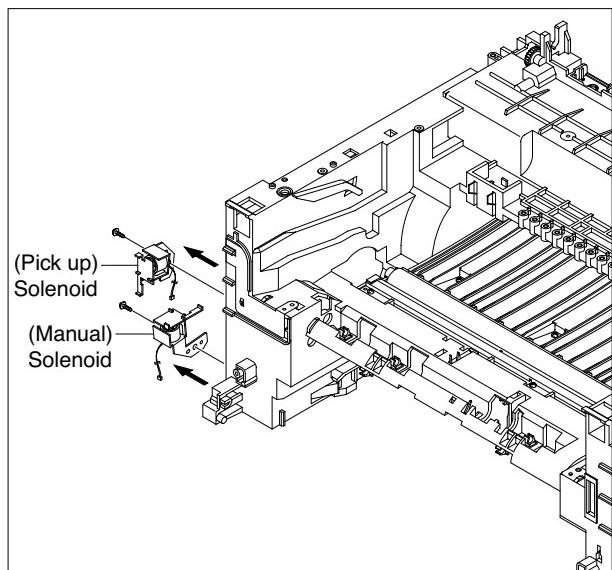
4. Adjustment and Troubleshooting

4.1 Alignment and Adjustments

4.1.1 Paper path
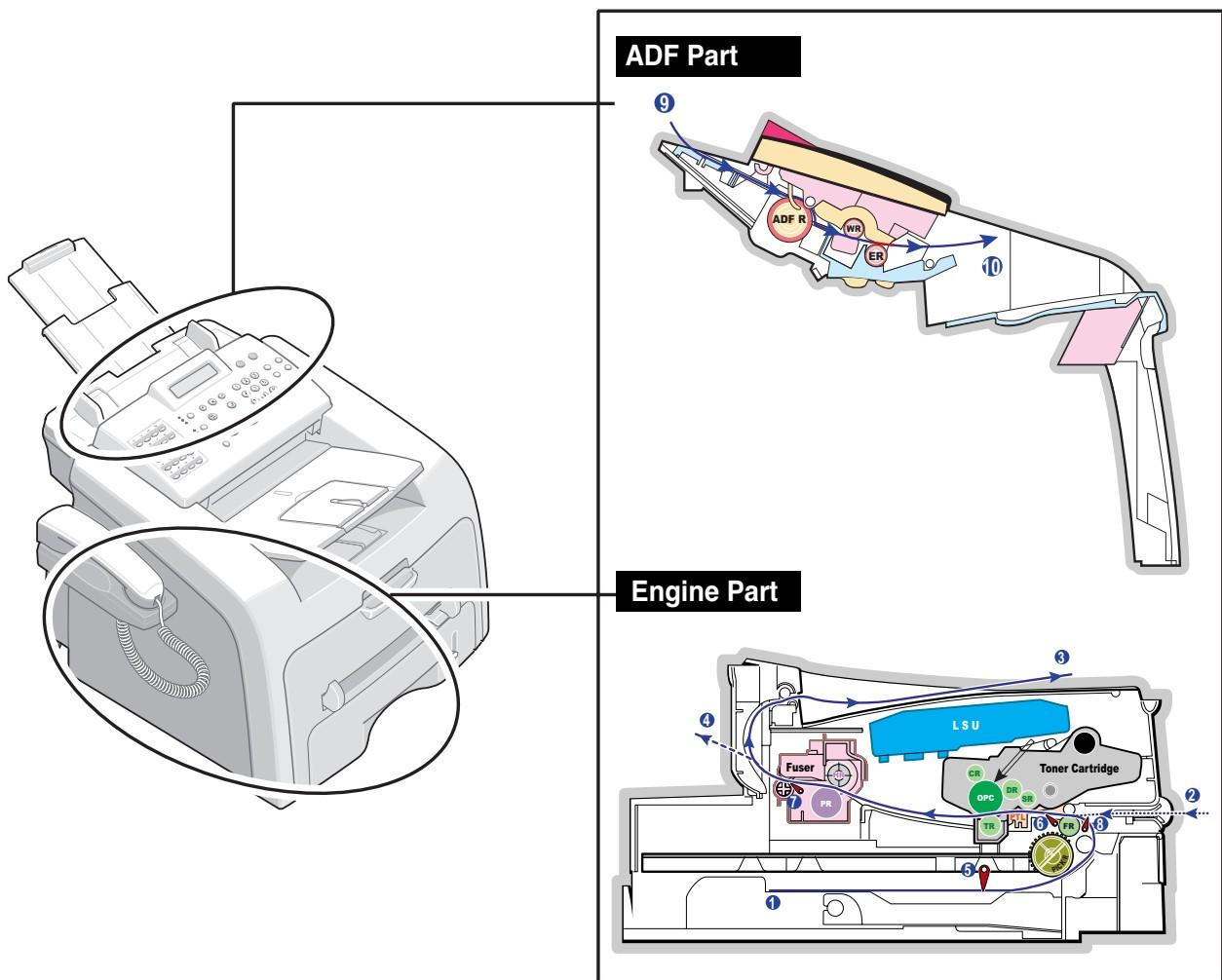
4.1.1.1   Copy & Scan Document Path

ADF Part
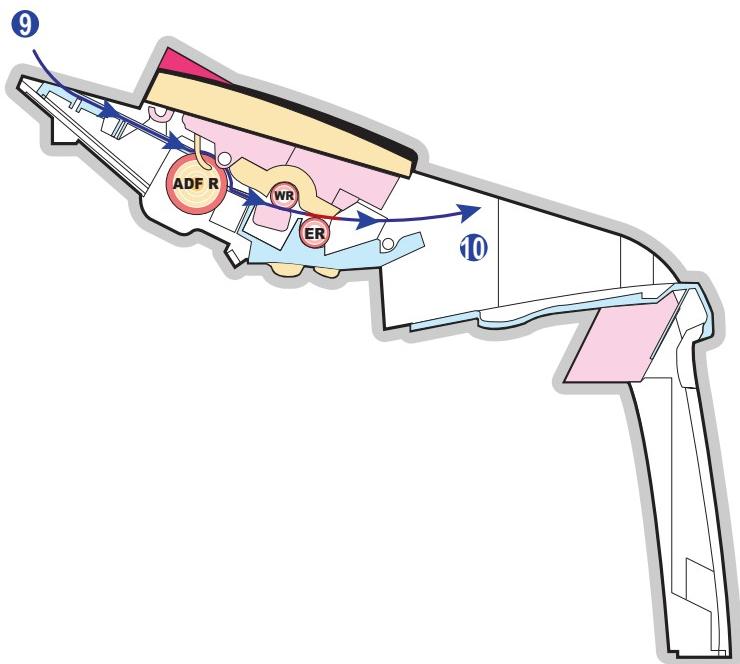
4.1.1.2 Printer Paper Path

1) After receiving print job the printer feeds printing paper from the cassette or manual feeder.
2) The fed paper passes the paper feeding sensor. (Jam 0 occurs if the sensor is not operated within a certain time)
3) After passing the feed sensor the paper passes through the print process to the paper exit sensor. (Jam 1 occurs if the sensor is not operated by the paper's leading edge within a certain time)
4) After passing the exit sensor paper exits from the set. (Jam 2 occurs if the trailing edge of the paper does not pass the exit sensor within a certain time)

Engine Part
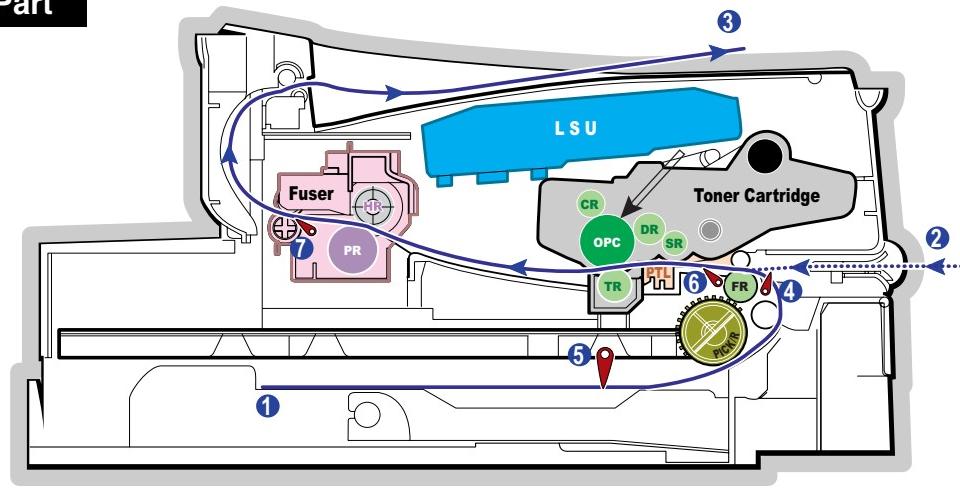
❶	Paper Input (Cassette)	❺	Paper Empty Sensor (Cassette)
❷	Paper Input (Manual Feed)	❻	Paper Feed Sensor
❸	Paper Out (Face Down)	❼	Paper Exit Sensor
❹	Paper Empty Sensor (Manual)		

4.1.2 Clearing Paper Jams

Occasionally paper can become jammed during a print job. Some of the causes include:
- The tray is loaded improperly or overfilled.
- The tray has been pulled out during a print job.
- The front cover has been opened during a print job.
- Paper was used that does not meet paper specifications.
- Paper that is outside of the supported size range was used.

If a paper jam occurs the On Line/Error LED on the control panel lights red. Find and remove the jammed paper. If you don't see the paper, open the covers.
Do not use a tweezers, pincers or other metal tools when removing a jam.
This could damage the internal mechanism causing print quality problems or possibly electrical shock..
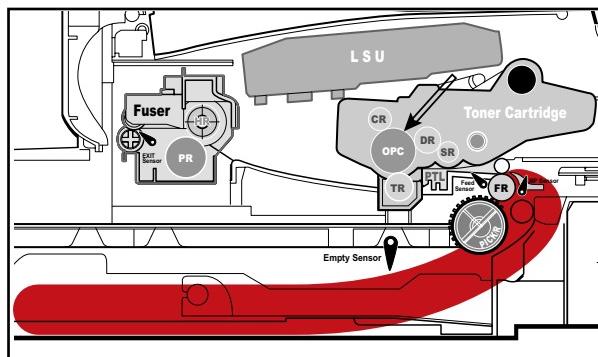
Paper Jam0
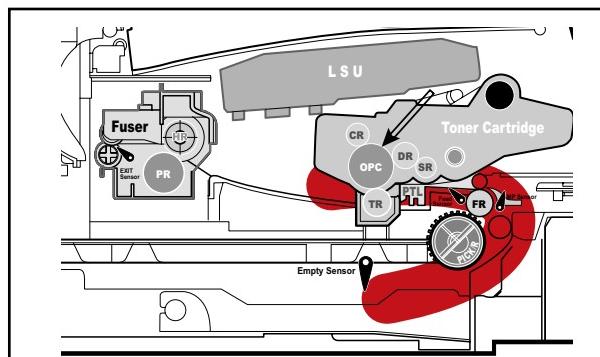
Paper Jam1
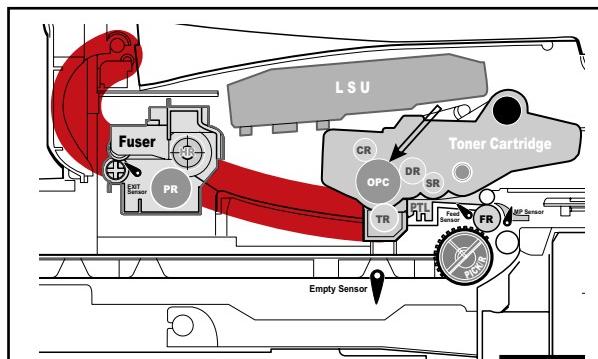
Paper Jam2
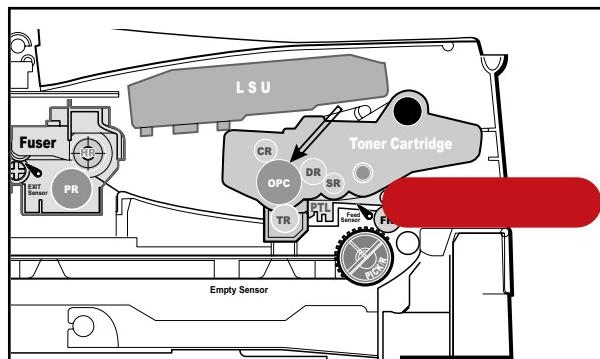
Bypass Jam

4.1.2.1 Clearing Document Jams

When a document jams while passing through the ADF (Automatic Document Feeder) "Document Jam" appears on the display.

4.1.2.1(a) Input Misfeed

1) Remove the remaining documents from the ADF.

2) Pull the jammed document gently out of the ADF.
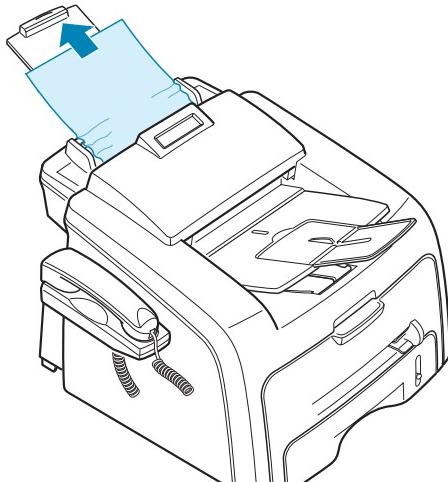
3) Load the documents back into the ADF.

NOTE :To prevent document jams do not use thick, thin or mixed documents.

4.1.2.1(b) Exit Misfeed

1) Remove the remaining documents from the ADF.

2) Open the control panel by gripping its lower front edge and lifting gently.
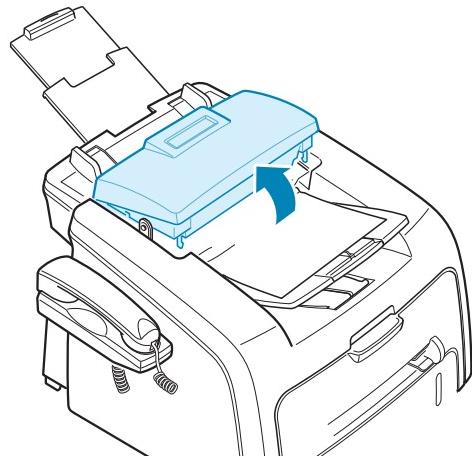
3) Pull the document gently out of the ADF.
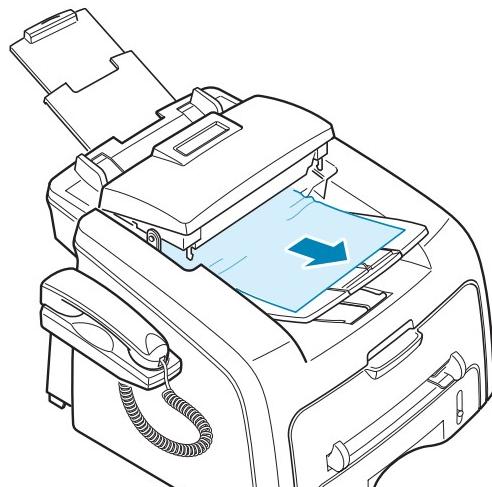
4) Close the control panel, then load the documents back into the ADF.

4.1.2.2 Clearing Paper Jams

When a paper jam occurs, "Paper Jam" appears on the display. Refer to the table below to locate and clear the paper jam.

Message	Location of Jam
Paper Jam 0	In the paper tray.
Paper Jam 1	In the fuser area or around the toner cartridge.
Paper Jam 2	In the paper exit area
Bypass Jam	In the manual feeder

To avoid tearing the paper pull the jammed paper out gently and slowly. Follow the steps on the next pages to clear the jam.

4.1.2.2.1 In the Paper Tray

1) Open and close the front cover. The jammed paper is automatically ejected from the machine. If the paper is not ejected continue to step 2.

2) Pull the paper tray open.
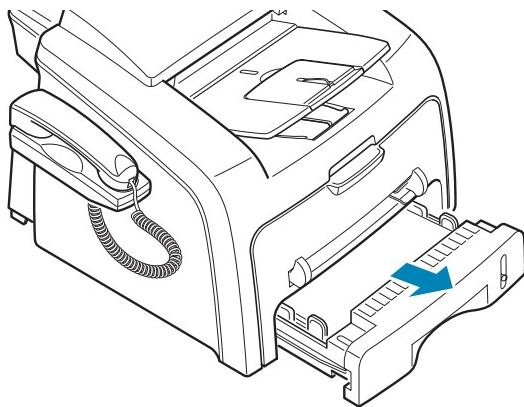
3) Remove the jammed paper by gently pulling it straight out.
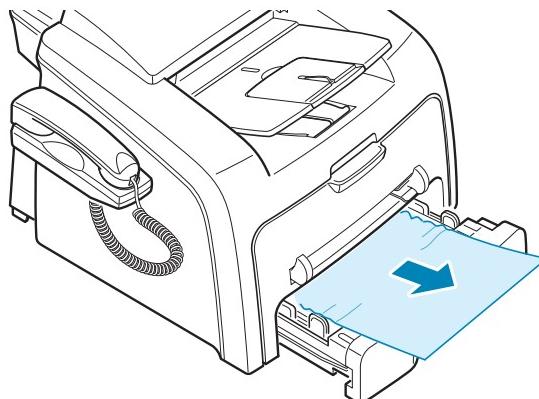
If there is any resistance and the paper does not move when you pull or if you cannot see the paper in this area, skip to the fuser area around the toner cartridge.

4) Insert the paper tray into the machine until it snaps into place.

5) Open and close the front cover to resume printing.

4.1.2.3 In the Paper Exit Area

1) Open and close the front cover. The jammed paper is automatically ejected from the machine. If the paper is not ejected continue to step 2.

2) Gently pull the paper out of the front output tray. Skip to step 6.
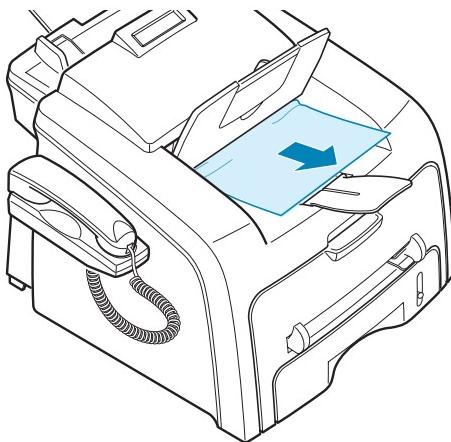
If there is any resistance and the paper does not move when you pull or if you cannot see the paper in the front output tray continue to step 3.

3) Open the rear cover.

4) Remove the jammed paper by gently pulling it straight out.
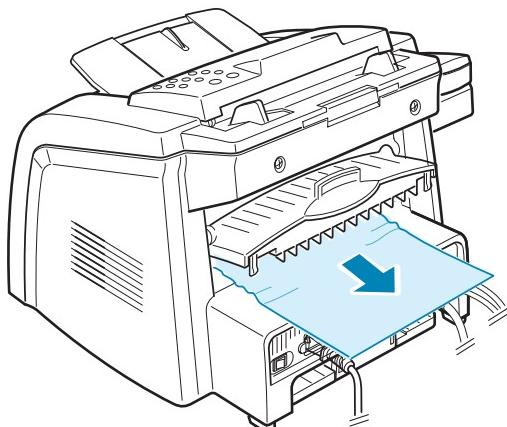
5) Close the rear cover.

6) Open and close the front cover to resume printing.

4.1.2.4 In the Fuser Area or Around the Toner Cartridge

NOTE :The fuser area is hot. Take care when removing paper from the machine.

1) Open the front cover and lightly push down on the cartridge then pull to take it out.
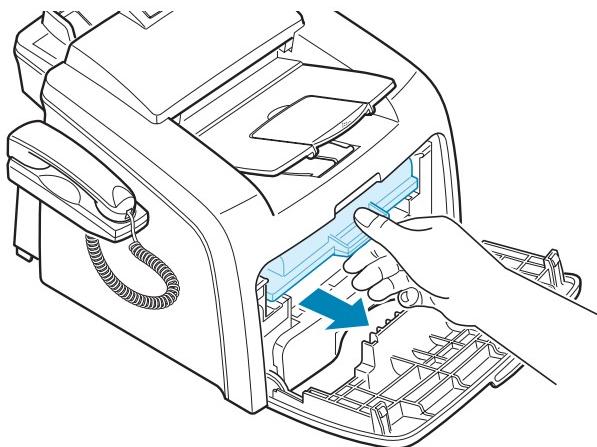
2) Remove the jammed paper by gently pulling it straight out.
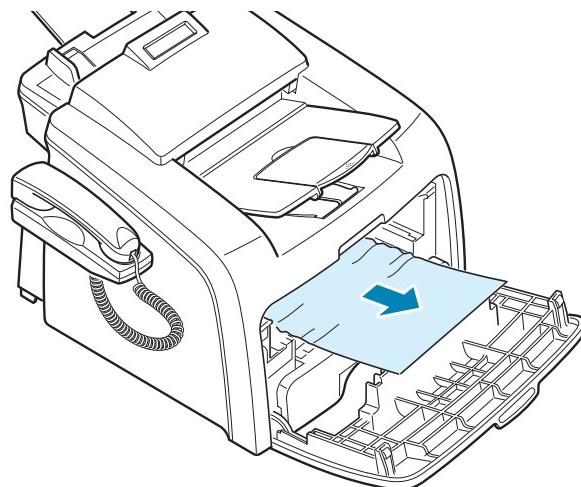
3) Replace the toner cartridge and close the front cover.
   Printing automatically resumes.

4.1.2.5 In the Bypass Tray

"Bypass Jam" appears on the display when you try to print using the manual feeder and the machine does not detect paper due to no paper or improper paper loading.

The error message may also occur when the paper is not properly fed into the machine through the manual feeder. In this case pull the paper out of the machine.
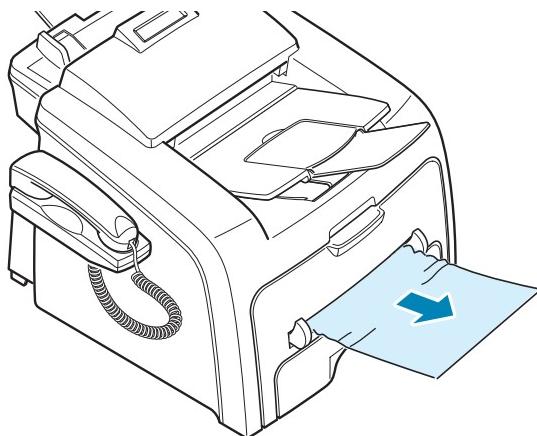
4.1.2.6 Tips for Avoiding Paper Jams

By selecting the correct paper types most paper jams can be avoided. When a paper jam occurs follow the steps outlined in page 6-10

• Follow the procedures on page 6-10 when you load paper. Ensure that the adjustable guides are positioned correctly.

• Do not overload the paper tray. Ensure that the paper is below the paper capacity mark on the inside wall of the paper tray.

• Do not remove the paper from the tray while your machine is printing.

• Flex, fan and straighten the paper before loading.

• Do not use creased, damp or highly curled paper.

• Do not mix paper types in the paper tray.

• Use only recommended print materials. See "Paper Specifications" in the user manual.

• Ensure that the print side of print materials is facing down in the paper tray and facing up in the Bypass tray.

4.1.3 User Mode(SF-565PR)

The table below shows the map of User settings available in User Mode. These are fully described in the User Guide and are not included here.

1. Paper Setting

Paper Type
Paper Size

2. Copy Setup

Default-Change
Timeout

3. Fax Setup

Ring to Answer
Darkness
Redial Term
Redials
MSG Confirm.
Auto Report
Auto Reduction
Discard Size
Receive Code

6. Reports

Phone Book
Send Report
RCV Report
System Data
Scheduled Jobs
MSG Confirm.
Junk Fax List

5. Advanced Fax

Send Forward
RCV Forward
Toll Save
Junk Fax Setup
Secure Receive
Prefix Dial No
Stamp RCV Name
ECM Mode

4. Fax Feature

Delay Fax
Add Page
Cancel Job
Delay Rx Poll

7. Sound/Volume

Speaker
Ringer
Key Sound
Alarm sound

8. Machine Setup

Machine ID
Date &Time
Clock Mode
Language
Power Save
Ignore Toner
USB Mode

9. Maintenance

Clean Drum
Notify toner
Clear Memory
Adjust Shading

4.1.4 Tech Mode

4.1.4.1 How to Enter Tech Mode

In service (tech) mode the technician can check the machine and perform various tests to help with failure diagnosis.
When in Tech mode the machine still performs all normal operations.

To enter the Tech mode

To enter the Tech mode press in sequence $\text{Menu} \rightarrow \# \rightarrow 1 \rightarrow 9 \rightarrow 3 \rightarrow 4$ and the LCD briefly displays 'TECH', the machine has entered service (tech) mode.

4.1.4.2 Tech Mode settings map

Data Setup	**Machine test**	**Report**	**New Cartridge**
Send Level Modem Speed Daial Mode Error Rate Notify Toner Clear All Memory Clear Count Flash Upgrade Silence Time	Switch Test Modem Test Dram Test Rom Test Pattern Test Shading Test	Protocol System Data	YES NO
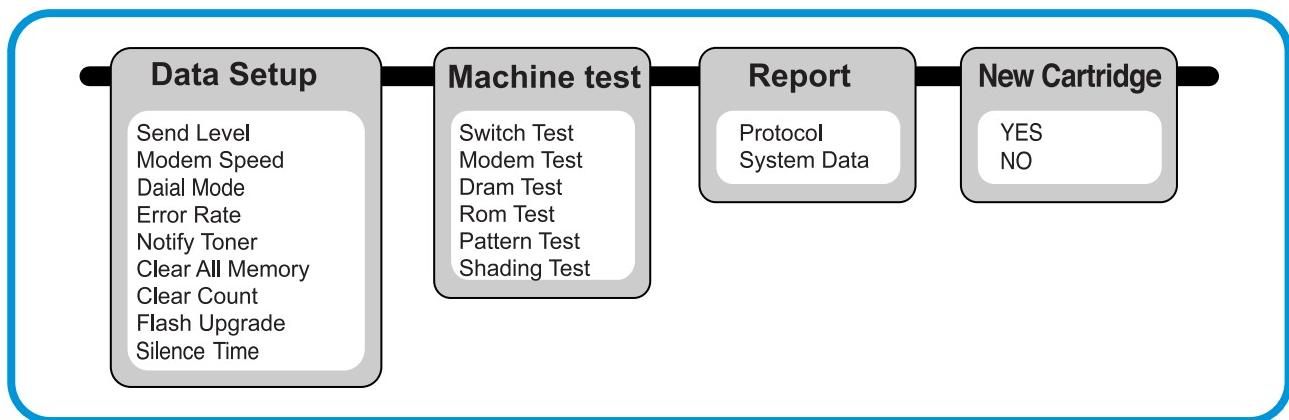
4.1.4.3 Data Setup

SEND LEVEL

You can set the level of the transmission signal. Typically, the Tx level should be under -12 dBm.

Caution : The Send Fax Level is set to the best condition during manufacture. Never change settings arbitrarily.

DIAL MODE

This function can choose the dialing method.
*Default : Dial (Dial/Pulse)

MODEM SPEED

You can set the maximum modem speed.
When the fax establishes communication with a remote set the value of the maximum modem speed is checked for both transmitter and receiver. The lowest value is used. It is best set at 33.6Kbps, the default setting.

ERROR RATE

When the error rate is about exceed the set value, the Baud rate automatically adjusts to 2400 bps.
This ensures that the error rate remains below the set value.
You can select the rate between 5% and 10%.

CLEAR ALL MEMORY

The function resets the system to factory default settings.
This function is used to reset the system to the initial value when the product is functioning abnormally. All the values are returned to the default values, and all the information which was set by the user will be erased.

< Method >
1. Select the [MEMORY CLEAR] in TECH MODE.
2. Push the ENTER button.
3. Select your country. (There are four country groups. Refer to the table below.)
4. Push the ENTER button then it will clear all memory.

NOTICE : Always perform a memory clear after replacing the main board, otherwise the system may not operate properly.

Country Group	USA/Canada	UK	Russia	South Africa
Country	USA/Canada Mexico Brazil	UK Germany France Italy Spain Austria Netherlands Belgium Portugal Sweden Norway Denmark Finland Switzerland Greece Ireland Turkey	Russia India Oman Poland Bangladesh Kuwait Morocco Algeria Pakistan UAE Bahrain Sri Lanka Saudi Arabia Chile Peru Argentina Hungary Romania Bulgaria Czech	South Africa

FLASH UPGRADE

There are 2 methods to update the Flash Rom, Local and Remote.

(1) Local Machine

・RCP (Remote Control Panel) mode

This method is for Parallel Port or USB Port. Connect the PC and activate the RCP (Remote Control Panel) to upgrade the Firmware.

< Method >
How to Update Firmware using RCP
1. Connect PC and Printer with a USB Cable.
2. Run the RCP utility and select Firmware Update.
3. Search for the Firmware file to be used to update the set using the Browse Icon.
4. Click the Update icon. The firmware file is transmitted to the Printer automatically and the printer is initialized when the download completes.
5. Click the Refresh icon and check that the updated version numbers are displayed.

・DOS Command mode

This method is ONLY for Parallel Port. Connect the PC to the set using a Parallel Cable and enter the DOS Command to upgrade the firmware.

< Method >
1. First of all you need the following files : down.bat, down_com.bin, fprt.exe, and Rom File: (file name for upgrade). Ensure you save ALL of these files in the same folder.
2. At the DOS prompt enter the correct command (as shown below) and push the enter key.
   Then the upgrade will automatically take place..
3. There are two commands use the correct one depending on the condition of the set..
   * When the product is in the idle condition
     down "rom file"
   * When the product is in Ready condition
     (TECH MODE --> DATA SETUP --> FLASH UPGRADE --> LOCAL)
     fprt "rom file"
4. Do not turn off the power during the upgrade process.

(2) Remote FAX

It is possible to use a set that already has the latest firmware to upgrade a remote set remotely using the telephone system.

< Method >
1. On the set that has the latest firmware set it toi transmit the upgrade:-
   (TECH MODE ・DATA SETUP・・・・ FLASH UPGRADE・・・・ REMOTE)
2. Enter the telephone number of the set that needs to be upgraded.
   (Several faxes can be upgrade at the same time. In this case, enter each fax number.)
3. When the enter button is pressed the set sends the firmware file by calling designated fax number.
   (Around 10~15 minutes are needed to send the file.)

< Caution >
1. The Sending and Receiving fax machines MUST be the same model.
2. The sending fax must be set up in ECM mode and the Receiving fax memory must be 100%.
   If not the function will not work.

4.1.4.4 Machine Test

SWITCH TEST

Use this feature to test all keys on the operation control panel. The result is displayed on the LCD window each time you press a key.

MODEM TEST

Use this feature to hear various transmission signals to the telephone line from the modem and to check the modem, amplifier and speaker. If no transmission signal sound is heard, it means the modem part of the main board, amplifier, speaker or speaker harness is faulty.

DRAM TEST

Use this feature to test the machine's DRAM. The result appears in the LCD display.
If all memory is working normally, the LCD shows << O K >>

ROM TEST

Use this feature to test the machine's ROM. The result and the software version appear in the LCD display.
• FLASH VER : 1.00 V
• ENGINE VER :1.00V

PATTERN TEST

Using this pattern printout you can check that the printer mechanism is functioning properly.
This function is for factory manufacturing use only.

SHADING TEST

The function is used to set the optimum scan quality determined by the specific characteristics of the CIS (Contack Image Sensor). If copy image quality is poor perform this function to check the condition of the CIS unit.

< Method >

1. Select the [Shading Test] in TECH MODE(Manu, #, 1934).
2. Push the ENTER button and an image will be scanned.
3. After scanning the CIS SHADING PROFILE will be print out.
4. If the printed image is different to the sample image shown the CIS is defective.

NOTICE : When you test the CIS, make sure that the cover is closed.

```
SHADING VALUE


  1. MONO GRAY SHADING :
      Max. = 255  Min. = 167  Avg. = 196  Lower Cnt = 0  Led On Time = 4656 us



  =======> RESULTS : Pass
```
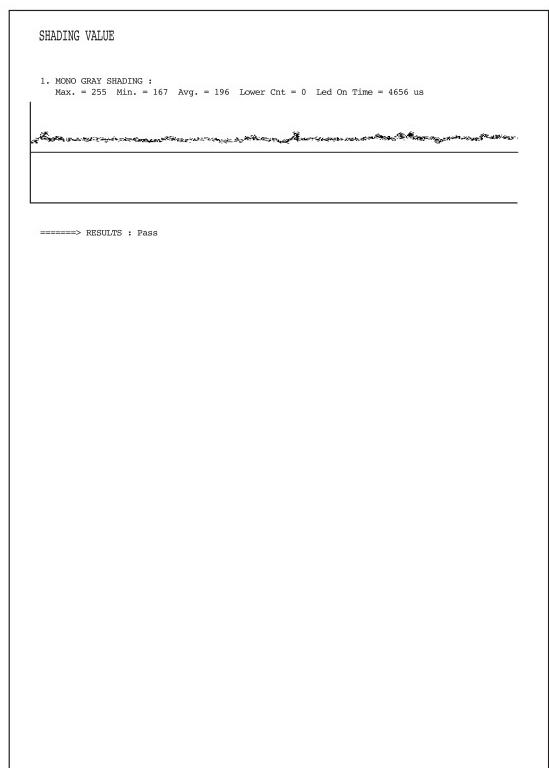
4.1.4.5 Report

PROTOCOL LIST

This list shows the sequence of the CCITT group 3 T.30 protocol during the most recent sending or receiving operation. Use this list to check for send and receive errors. If a communication error occurs while the machine is in TECH mode, the protocol list will print automatically.

SYSTEM DATA

This list provides a list of the user system data settings and tech mode settings.

4.1.5 Engine Test Mode

The Engine Test Mode supplies useful functions to check the condition of the print engine. It tests the condition of each device and displays the result of the test on the LCD. It is divided into 5 functions (0~4), and these are shown below.

4.1.5.1 To enter the Engine Test Mode

To enter the Engine Test mode

Press (Menu) → (#) → (1) → (9) → (3) → (1) in sequence, and the LCD briefly displays

'Engine Test', the machine has entered Engine Test Mode.
Press "0", "1", "2", "3" or "4" to select the Test No. (see list below – left hand column)

4.1.5.2 Diagnostic

NO.	Sub No.	Engine test	Remark
0	1	Motor Test	1 : On, 2 : Off – next test selected
	2	Pick Up Test	1 : On, 2 : Off – next test selected
	3	Fan Test	1 : On, 2 : Off – next test selected
	4	Manual Clt Test	1 : On, 2 : Off – next test selected
	5	PTL Test	1 : On, 2 : Off – next test selected
1	1	LSU Motor Test	1 : On, 2 : Off – next test selected
	2	LSU Hsync Test	1 : On, 2 : Off – next test selected
	3	LD Test	1 : On, 2 : Off – next test selected
2	1	Feed Sensor Test	1. Check : read the sensor
			2. Next : Next Sensor test
	2	Exit Sensor Test	1. Check : read the sensor
			2. Next : Next Sensor test
	3	Cover Sensor Test	1. Check : read the sensor
			2. Next : Next Sensor test
	4	Empty Sensor Test	1. Check : read the sensor
			2. Next : Next Sensor test
	5	Manual Sensor Text	1. Check : read the sensor
			2. Next : Next Sensor test
3	1	Therm ADC 180	1 : On, 2 : Off (maintain the fusing temp. 80C)
	2	Therm ADC 140	1 : On, 2 : Off (maintain the fusing temp. 135C)
	3	Therm ADC 120	1 : On, 2 : Off (maintain the fusing temp. 160C)
	4	Therm ADC 100	1 : On, 2 : Off (maintain the fusing temp. 191C)
4	1	MHV Test	1 : On, 2 : Off (-1550V ± 50V)
	2	Dev Bias Test	1 : On, 2 : Off (-430V ± 20V)
	3	THV EN/NEG Test	1 : On, 2 : Off (-1000V +300V/-150V)
	4	THV ON (1300V)	1 : On, 2 : Off (+1300V ± 20V)
	5	THV ADC 1300V	1 : On, 2 : Off (ADC Value : 101 ± 5)
	6	THV ADC 600V~3500V	1 : On, 2 : Off (Compare each ADC Value)

4.1.6 Identify Sale Date

This function confirms the date that consumer used the product for the first time.
When the consumer first operate the machine, it will start the scan and page counters.
The time the machine was first used is remembered.

These settings are remembered after memory reset (Clear All Memory).

< Method >

Press MENU, #, 1, 9, 3, # in sequence. Firmware version is displayed on LCD.
Press 1(in the number keypad) : The LCD display shows "Updated date"
Press 2(in the number keypad) : The LCD display shows "Product first use date"

4.1.7 Consumables and Replacement Parts

The life cycle outlined below is a general guideline for maintenance purposes and is for reference only. Environmental conditions (temperature, humidity, dust etc.) and actual use can cause these figures to vary.

COMPONENT	REPLACEMENT CYCLE
ADF Rubber	20,000 Pages
ADF Roller	60,000 Pages
Pick-up Roller	60,000 Pages
Friction Pad	60,000 Pages
Transfer Roller	60,000 Pages
Fuser	60,000 Pages
Toner Cartridge	3,000 Pages (A4 ISO 19752 Standard)

4.1.8 Abnormal Image Printing and Defective Roller

If a mark or other printing defect occurs at regular intervals down the page it may be caused by a damaged or contaminated roller. Measure the repetition interval and refer to the table below to identify the roller concerned.
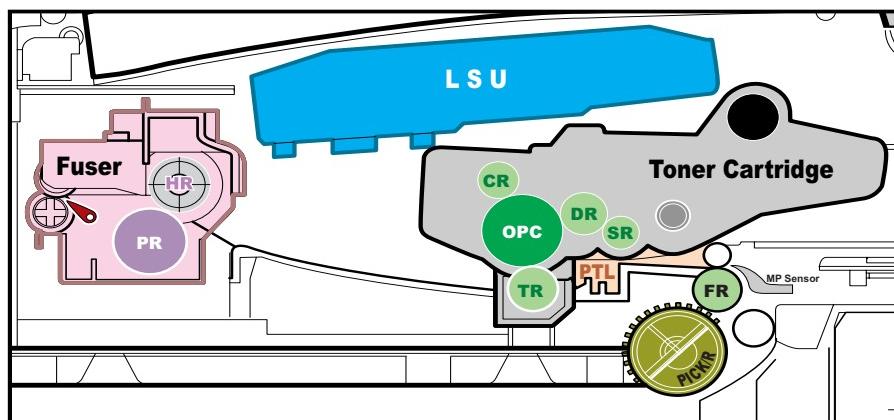
1. OPC Drum
2. Charge Roller
3. Supply Roller
4. Developing Roller

5. Transfer Roller
6. Heat Roller
7. Pressure Roller

No	Roller	Abnormal image period	Kind of abnormal image
1	OPC Drum	75.5mm	White spot, Block spot
2	Charge Roller	37.7mm	Black spot
3	Supply Roller	37.0mm	Horizontal density band
4	Develop Roller	35.2mm	Horizontal density band
5	Transfer Roller	45.3mm	Black side contamination/transfer fault
6	Heat Roller	66.3mm	Black spot and fuser ghost
7	Pressure Roller	75.5mm	Black side contamination

4.1.9 Error Messages

The front panel displays the printer's status or error messages. Refer to the list below for an explanation of these messages and how to clear problems. The messages and their meanings are listed in alphabetical order, with numbered messages following.

[Bypass Jam]
Meaning: The machine has detected a paper feed problem from the BYPASS Tray.
Solution: Open the side Cover and clear the jam.

Cancel ?
1:Yes 2:No
Meaning: While storing the document in memory the memory has become full.
Solution: To cancel the fax job, press the '1' button to accept "Yes." If you want to send the pages that were stored press the '2' button to accept "No." This will send ONLY the pages stored. The remaining pages should be sent later when more memory becomes available.

[Comm. Error]
Meaning: A problem with the fax communications has occurred.
Solution: Try again.

CRU Fuse Error
Meaning: The machine has a problem with recognizing the new toner cartridge.
Solution: Check the toner cartridge probrem.

Document Jam
Meaning: Loaded document has jammed in the ADF.
Solution: Clear the document Jam.

[Door Open]
Meaning: The front cover is not securely latched.
Solution: Close the cover until it clicks in place.

Group Not Available
Meaning: You have tried to select a group location where only a single location number can be used, such as when adding locations for a multi-dial operation.
Solution: Just use a one-touch or speed dial number or dial a number manually using the number keypad.

[Incompatible]
Meaning: The remote machine does not have the requested feature, such as a delayed transmission.
Solution: Reconfirm the remote machine's features.

[Jam 1] or [No Cartridge]
Meaning: Paper has jammed inside the unit, or the toner cartridge is not installed.
Solution: Clear the jam. Install the toner cartridge.

Line Busy
Meaning: The remote person did not answer or the line is already engaged.
Solution: Try again after a few minutes.

[Line Error]
Meaning: Your machine cannot connect with the remote machine or has lost contact because of a problem with the phone line.
Solution: Try again. If the problem persists, wait an hour or so for the line to clear and try again.Or, turn the ECM on.

Load Document
Meaning: You have attempted to set up a copy or fax operation with no document loaded.
Solution: Load a document and try again.

[Low Heat Error]
Meaning: There is a problem in the fuser unit.
Solution: Check thermostat, thermister contact point & Heating Lamp.

Open Heat Error
Meaning: Thermister is not connected to the main board or contact point is poor at power on.
Solution: Check thermostat, thermister contact point & Heating Lamp.

[Over Heat]
Meaning: The printer has overheated.
Solution: Your unit will automatically return to the standby mode when it cools down to normal operating temperature. If failure persists, check the ELA HOU-FUSER.

[LSU Error]
Meaning: A problem has occurred in the LSU (Laser Scanning Unit).
Solution: Use TECH mode to test LSU. Replace the LSU

Memory Full
Meaning: The memory has become full.
Solution: Either delete unnecessary documents, or retransmit after more memory becomes available, or split the transmission into more than one operation.

[No Answer]
Meaning: The remote machine did not answer after all the redial attempts.
Solution: Try again. Make sure the remote machine is OK.

NO. Not Assigned

Meaning: The speed dial location you tried to use has no number assigned to it.

Solution: Dial the number manually with the keypad, or assign the number.

[No Paper]Add Paper

Meaning: The paper cassette is empty. The printer system stops.

Solution: Load new paper in the paper tray.

Operation NotAssigned

Meaning: You are doing in the Add/ Cancel operation, but there is no jobs waiting.

Solution: Check the display to see if there is any scheduled job. The display should indicate them in Standby mode, for example, Delay Fax.

[Paper Jam 0]Open/Close Door

Meaning: Paper has jammed in paper feeding area. Paper is jammed in pick-up unit

Solution: Press STOP and clear the jam.

[Paper Jam 1]Open/Close Door

Meaning: Paper has jammed inside the unit. Paper has jammed in paper exit unit.

Solution: Clear the jam.

[Paper Jam 2]Check Inside

Meaning: Paper has jammed inside the unit. Paper has jammed in fuser area.

Solution: Clear the jam.

Power Failure

Meaning: Power has turned off then on and the machine's memory has not been saved.

Solution: You need to start again the job which you were trying to do before the power failure.

Retry Redial?

Meaning: The machine is waiting for the programmed interval to automatically redial.

Solution: You can press START to immediately redial, or STOP to cancel the redial operation.

[Stop Pressed]

Meaning: The Stop/Clear button is pressed during a copy or fax operation.

Solution: Try again.

[Toner Empty]

Meaning: The toner cartridge has run out. The machine stops printing.

Solution: Replace with a new toner cartridge.

[Toner Low]

Meaning: The toner cartridge is almost empty.

Solution: Take out the toner cartridge and gently shake it. By doing this, you can temporarily reestablish printing operations."

4.2 Troubleshooting

4.2.1 Procedure of Checkig the Symptoms

Before attempting to repair the printer first obtain a detailed description of the problem from the customer.

```
           ┌─────────────┐
           │  Power On   │
           └──────┬──────┘
                  │
                  ▼
              ◇ OP Panel ◇      No      ┌─────────────────────────┐
              ◇  ON?     ◇ ──────────▶  │ - No Power              │
                  │                      │ - Power Module error    │
                  │ Yes                  │ - Main PBA error        │
                  │                      │ - LCD Panel error       │
                  ▼                      └─────────────────────────┘
          ◇ Ready or ◇   No    ◇ Indicate      ◇   Yes   ┌──────────────────┐
          ◇ Power save ◇ ────▶ ◇ Error Massage ◇ ──────▶ │ Refer to         │
                  │             ◇              ◇          │ Error Massage    │
                  │ Yes              │ No                 │ <Chapter 4.1.9>  │
                  ▼                  │                    └──────────────────┘
           ┌─────────────┐          │
           │ Test Print  │◀─────────┘
           └──────┬──────┘
                  │
                  ▼
          ◇ printing  ◇   No     ┌──────────────────────┐
          ◇ Quality is ◇ ──────▶ │ Refer to "Solution   │
          ◇ Nomal?    ◇          │ of Image Problem"    │
                  │              └──────────────────────┘
                  │ Yes
                  ▼
           ┌─────────────┐
           │    END      │
           └─────────────┘
```
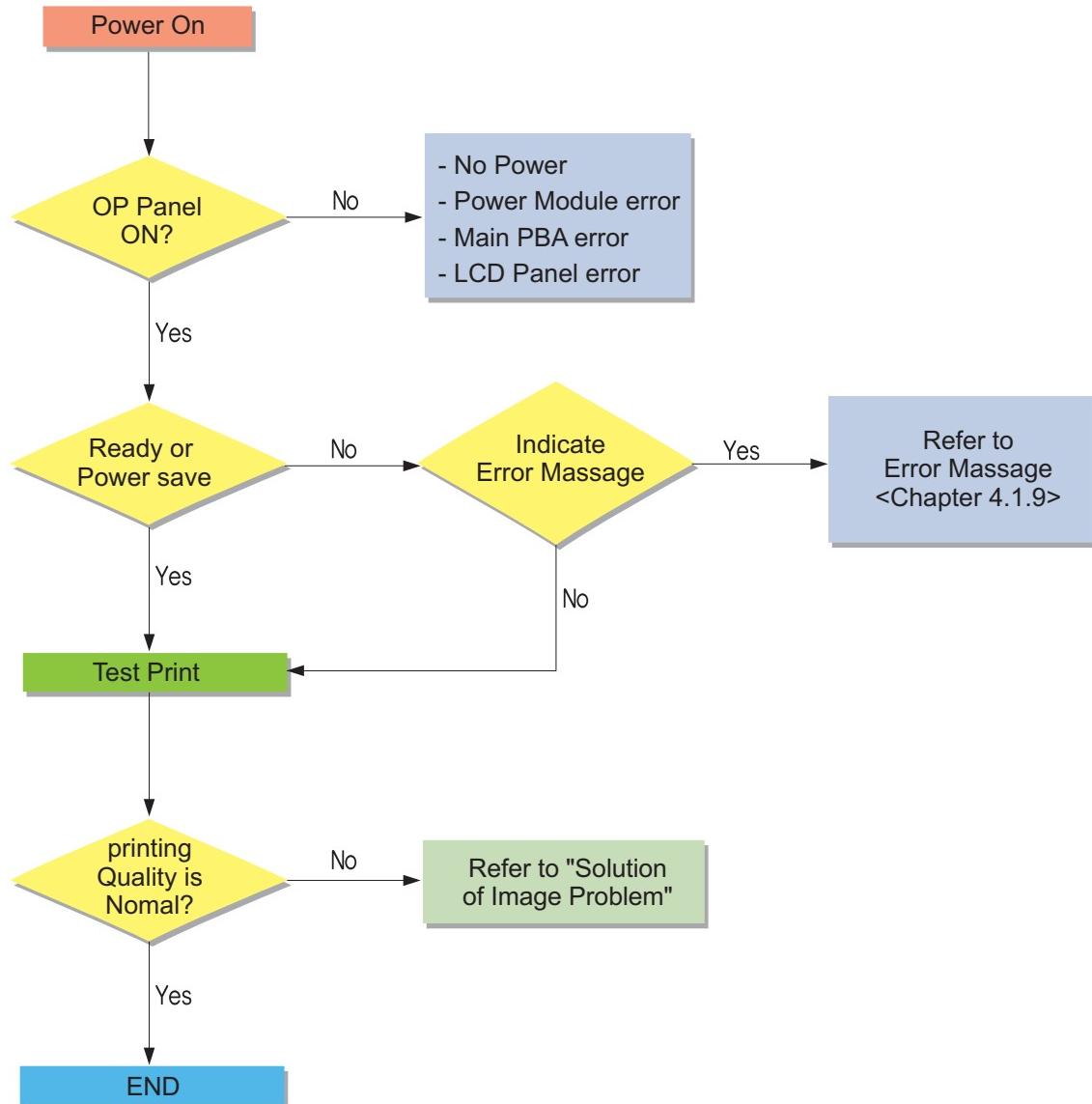
4.2.2 The cause and solution of image quality

1) Vertical Black Line and Band

Description: 1. Straight thin black vertical lines occur in the prnting
2. Dark black vertical bands occurrs in the printing

Check and Cause

Solution

1.Damaged developer roller, deformed Doctor-blade or cleaning blade in the toner cartridge.

Replace the toner cartridge and test again

2.Scratched surface of the charge roller in the toner cartridge.

Replace the toner cartridge and test again

3.Depression or deformation of the surface of the transfer roller.

Replace the transfer roller and test again

End

2) Vertical White Line

Description: White vertical voids in the image.

	Check and Cause	Solution

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause

Solution

1.Contamination of the window or internal lenses of LSU mirror.

Clean the LSU window with recommended cleaner(IPA). Clean the window with a clean cotton swab. If dir is inside the LSU-replace LSU.

2.Foreign object inside the toner cartridge or low toner.

Replace the toner cartridge .

3.Foreign object, contamination or burr on the edge of the toner cartridge window.

Clean the exposure window.

4.Of the fuser is defective, void occur periodically at the top of a black image.

Open the front cover and check the ribs that correspond to the position of the voids. Remove if found.

5.Of the fuser is defective, void occur periodically at the top of a black image.

Open the front cover and check the ribs that correspond to the position of the voids. Remove if found.

6.Depression or deformation of the surface of the transfer roller

Replace the transfer roller.

End

3) Horizontal Black Bands

Description: Dark or blurry horizontal stripes occur in the printing periodically
(These may occurs at regular intervals down the page.)

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause

Solution

1. Bad contacts on the toner cartridge high voltage terminals.

Clean all HV terminals on the cartridge and on the set frame. Ensure all toner or paper dust particles are removed.

2. The rollers in the toner cartridge may be contaminated.

1) Charge roller = 37.7 mm
2) Supply roller = 37 mm
3) Develop roller = 35.3 mm
4) Transfer roller = 45.3 mm

1. Clean the right Gear that has relatively small tooth gap on the OPC.
2. If the problem persists replace the toner cartridge.

End

4) Black/White Spot

Description: 1. Dark or blurry spots occur periodically in the printing
2. White spots occur periodically in the printing

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause

Solution

1. If dark or blurry black spots occur periodically, the rollers in the Developer may be contaminated with foreign matte or paper particles. (Charge roller : 37.7 mm interval OPC drum : 75.5 mm interval)

Print several OPC cleaning Mode Prints and then run the Self-test 2 or 3 times.

2. If faded areas or voids occur in a black image at intervals of 75.5 mm, or black spots occur elsewhere, the OPC drum surface is damaged.

75.5 mm repetition: Examine the surface of the OPC drum and carefully clean with a soft, lint free cloth. If unsuccessful replace the cartridge.
37.7mm repetition: Replace the toner cartridge

3. If a black image is partially broken, the transfer voltage is abnormal or the transfer roller's life has expired.

The transfer roller guarantees 60,000 sheets printing. If the roller's life is expired, replace it.

Note. Cleaning the inside of the set to remove excess toner particles or paper dust will reduce the occurrence of this problem.

End

5) Light Image

Description: The printed image is light, with no ghost.

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause

Solution

1.Toner Save mode enabled.

Ensure the Toner Save mode is off.
Check set and driver settings.

2.Develop roller is contaminated or
the toner cartridge is almost empty.

Replace the toner cartridge and
try to print out again.

3.Ambient temperature is below than 10℃

Wait 30 minutes ager printer is
powered in before you start printing.

4.Bad contact caused by dirty terminals on
the toner cartridge or set.

Clean the cartridge and set contacts.
Generally ceal dirt from inside
of the set.

5.Abnormal output from the HVPS.

Replace the HVPS if the problem
are not solved by the above four
instructions.

End

6) Dark image or Black

Description: The printed image is dark.

Check and Cause

Solution

1.No charge voltage in the engine board.

Check the state if the connector which connects the engine board and HVPS.

2.Charge voltage fault due to bad contact between toner cartridge and set contacts.

Clean the high voltage charge terminals.
Note if 1 and 2 do not solve the problem persists replace the HVPS.

3.VD0 signal of the Main PBA is low state.

Replace the LSU or Main PBA.

End

7) Uneven Density

Description: Print Density is uneven between left and right.

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause

Solution

1.The pressure force in the left and right springs of the transfer roller is not even, the springs are damaged, the transfer roller is improperly installed, or the transfer roller bushing or holders are damaged.

Replace the left and right bush and spring assemblies.

2.The life of the Toner Cartridge has expired.

Replace the toner cartridge and try to print out.

3.The toner level is not even in the toner cartridge roller due to the damaged blade or low toner.

Gently shake the toner cartridge and try printing again. If the problem persists replace the toner cartridge.

End

8) Background

Description:Light dark background appears in whole area of the printing.

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause

Solution

1.Printing large quantities of low coverage (2%) pages or the printer has not been used for a long time.

The toner cartridge is basically designed to print 3,000 sheets with Std. image. If it prints more than 3,600 sheets with 2% coverage, a background can occur.

2.Is a recycled toner cartridge be used?

The A/S is not guaranteed if using a recycled toner cartridge.
Note: Try shaking the toner cartridge gently from side to side.
If the problem persists, replace the toner cartridge.

3.Has the life span of the toner cartridge ended?

Replace the toner cartridge when its life is expired.

4.Is the movement(Up and Down) of the transfer roller smooth?

Clean the transfer roller bushes.

5.Is the HVPS normal?

Clean the high voltage charge terminals. If this does not reslove the problem replace the HVPS.

End

9) Ghost(1)

Description: Ghost occurs at 75.5 mm intervals of the OPC drum in the whole printing.

Check and Cause

Solution

1.Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the electrode of the Toner cartridge.

2.Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the one in the HVPS board.

1 and 2. Clean all HV contacts. If problem persist replace the HVPS.
If problem still persists replace the Main PBA.

3.The life of toner cartridge is expired.

Replace the toner cartridge and try to print out

4.Transfer roller life(60,000 sheets)

Check the transfer roller lifetime and replace it.

5.Low ambient temperature(below10℃)

Wait about 30 minutes after power in before using printer.

6.Damaged cleaning blade in the toner cartridge.

Replace the toner cartridge and try to print out again.

End

10) Ghost (2)

Description: Ghost occurs at 75 mm intervals of the OPC drum in the whole printing.
(When printing on card stock or transparencies using manual feeder)

Check and Cause

When printing on card stock thicker than normal paper or transparencies such as OHP, higher transfer voltage is required.

Solution

Ensure that the correct paper type is selected in the printer driver or application software. Remember to set back to normal paper after use.

End

11) Ghost (3)

Description: Ghost occurs at 66.3 or 75.5 mm intervals.

Digital Printer
Digital Printer
Digital Printer

66.3 or 75.5 mm

Check and Cause

1. Fuser contamination.

End

Solution

Disassemble the fuser and remove any contamination on the rollers. Clean any contamination from between the Thermistor and the Heat roller. (Caution: Take care not to deform the rollers.)
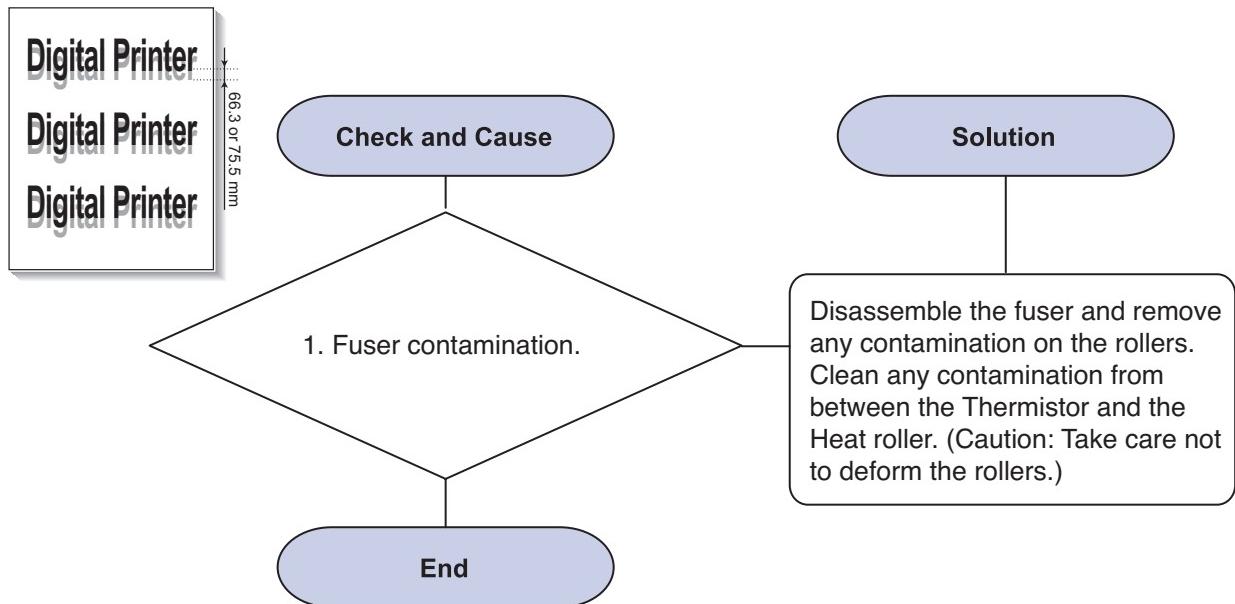
12) Ghost (4)

Description: A White ghost occurs in a black image printing at 32 mm intervals.

Digital Printer
Digital Printer
Digital Printer

32 mm

Check and Cause

Solution

1. The life of the developer may be expired.

Problem in the toner cartridge, replace the toner cartridge and try to print out again.

2. Abnormal output from the HVPS.

Check the HVPS supply voltage. Clean all HV terminals on the cartridge and on the set. Replace the HVPS if the problem persists.

End

13) Stains on the Face of Page

Description: The background on the face of the printed page is stained.

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause

Solution

1. Toner leakage due to improperly sealed toner cartridge.

Replace the toner cartridge.

2. If the transfer roller is contaminated, stains on the face of page will occur.

If the transfer roller is contaminated, run PC Cleaning Mode Print 2 or 3 times. And perform Self-Test 2 or 3 times to remove contamination.

End

14) Stains on Back of Page

Description: The back of the page is stained at 45.3 or 75.5 mm intervals.

Check and Cause

Solution

1. 45.3mm : Transfer roller is contaminated.

Perform the OPC Cleaning Mode Print 2 or 3 times. Run Self-Test to remove the contamination from the transfer roller.
Note. Replace the transfer roller if contaminated severely.

2. 75.5mm : Pressure roller is contaminated.

Disassemble the fuser and clean the H/R(Heat Roller) and P/R (Pressure roller). Check and clean the area between the H/R and the Thermistor. (Caution: Take care not to deform the rollers.)

End

15) Blank Page Print out (1)

Description: Blank page is printed.

Check and Cause

1. Bad ground contacts in OPC and/or toner cartridge.

End

Solution

1. Check if the Ground-OPC or the OPC Ground Zener diode are defective or open circuit. (set inside left side)

2. Remove contamination of the terminals on the toner cartridge and the unit.

16) Blank Page Print out (2)

Description: 1. Blank page is printed.
2. One or several blank pages are printed.
3. When the printer turns on, several blank pages print.

Check and Cause

1. Abnormal solenoid.

Solution

Perform the engine self test using TECH Mode to check if the Solenoid is normal.
If the problem persists replace the main PBA

End
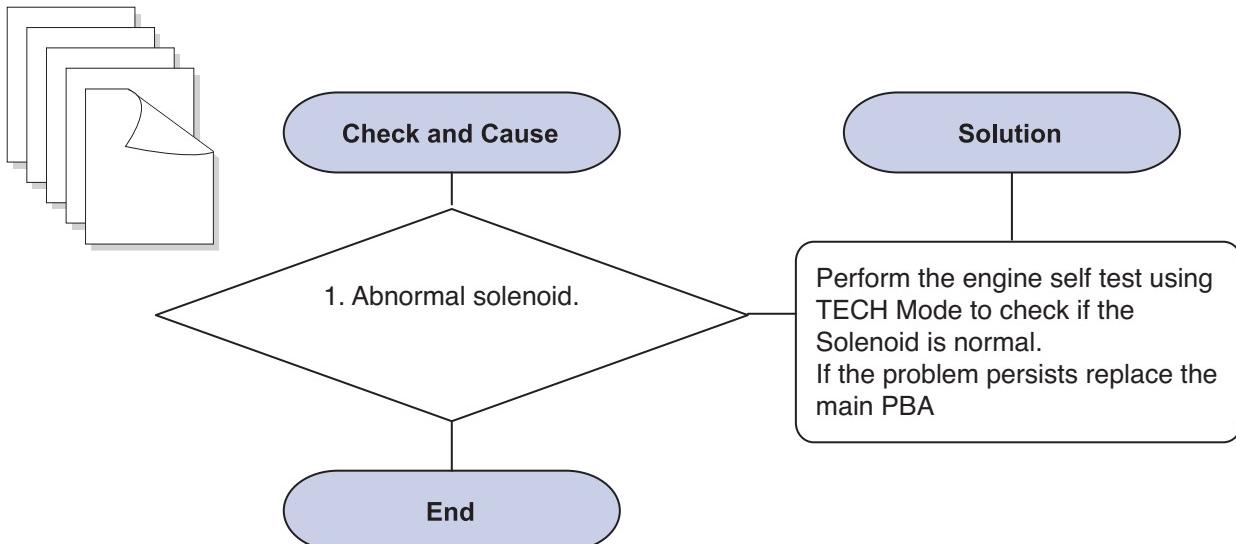
4.2.2 Fax & Phone Problems

1) No Dial Tone

Description: There is no dial tone when the On-Hook dial button is pressed.

Check and Cause	Solution
1. Check that the telephone line cord supplied with the set is connected to TEL LINE correctly.	If the telephone cord is OK but there is no dial tone, try plugging a normal telephone into the wall socket. I this is OK then replace the Main B'd.
2. Listen for a CLICK sound when the OHD key is pressed.	If you cannot hear the OHD CLICK sound, the OPE Ass'y may be defective. Replace the OPE Ass'y.
3. Check that the SPEAKER is connected correctly.	Use Tech mode / Modem Test to check that the speaker and amplifier are working. Replace the Main B'd.

End

2) Defective MF DIAL

Description: The MF DIAL is not functioning.

Check and Cause

Solution

1. Check that the telephone line cord supplied with the set is connected to TEL LINE correctly.

If the telephone cord is OK but there is no dial tone, try plugging a normal telephone into the wall socket. I this is OK then replace the Main B'd.

2. Listen for a CLICK sound when the keKEY is pressed.

If you cannot hear the OHD CLICK sound, the OPE Ass'y may be defective. Replace the OPE Ass'y.

3. Check that the SPEAKER is connected correctly.

Use Tech mode / Modem Test to check that the speaker and amplifier are working. Replace Main B'd in sequence.
Notes: Product supports MF DIAL type only.

End

3) Defective FAX FORWARD/RECEIVE

Description: FAX FORWARD/RECEIVE is not functioning.

Check and Cause

Solution

1. Check that you can hear a dial tone by pressing OHD.

If MODEM testing is normal and there is no dial tone, then try replacing the Main B'd.

2. Check that you can hear a RECEIVE tone when MODEM testing in TECH Mode.

If testing the MODEM shows a fault replace the Main B'd.

End
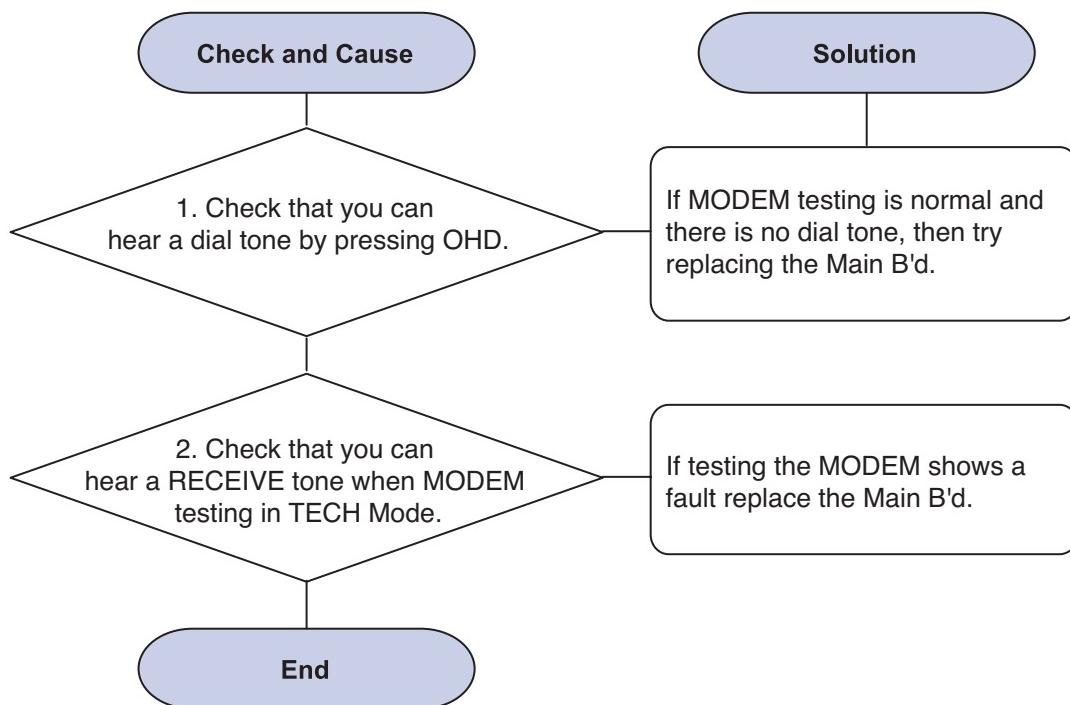
4) Defective FAX FORWARD

Description: RECEIVE is functioning, but FORWARD is not functioning or received data is corrupt.

Check and Cause	Solution
1. Check if there is a NOISE line by pressing on-hook dial and listening.	If you can hear a noisy line when using on-hook dial, replace or repair the telephone line.
2. Check that the destination fax machine can receive forwarded faxes by using a different sending fax machine (preferably from the same wall socket).	Replace Main.
3. Check the cable between the set and the wall socket for damage.	Replace the line cord.

End

5) Defective FAX RECEIVE (1)

Description: FORWARD is functioning, but RECEIVE is not functioning or the received data is corrupt.

Check and Cause

Solution

1. Check if there is a NOISE line by pressing on-hook dial and listening

If you can hear a noisy line when using on-hook dial, replace or repair the telephone line.

2. Use a different fax machine to receive from the same sender (if possible on the same wall socket).

Replace the Main.

End

6) Defective FAX RECEIVE (2)

Description: Received data are lengthened or cut in the printing.

Check and Cause	Solution

1. Check if there is a NOISE line by pressing on-hook dial and listening

If you can hear a noisy line when using on-hook dial, replace or repair the telephone line.

2. Ask sender to send to another fax machine (if possible connected to the same wall socket)

Replace main PBA in sequence.

End
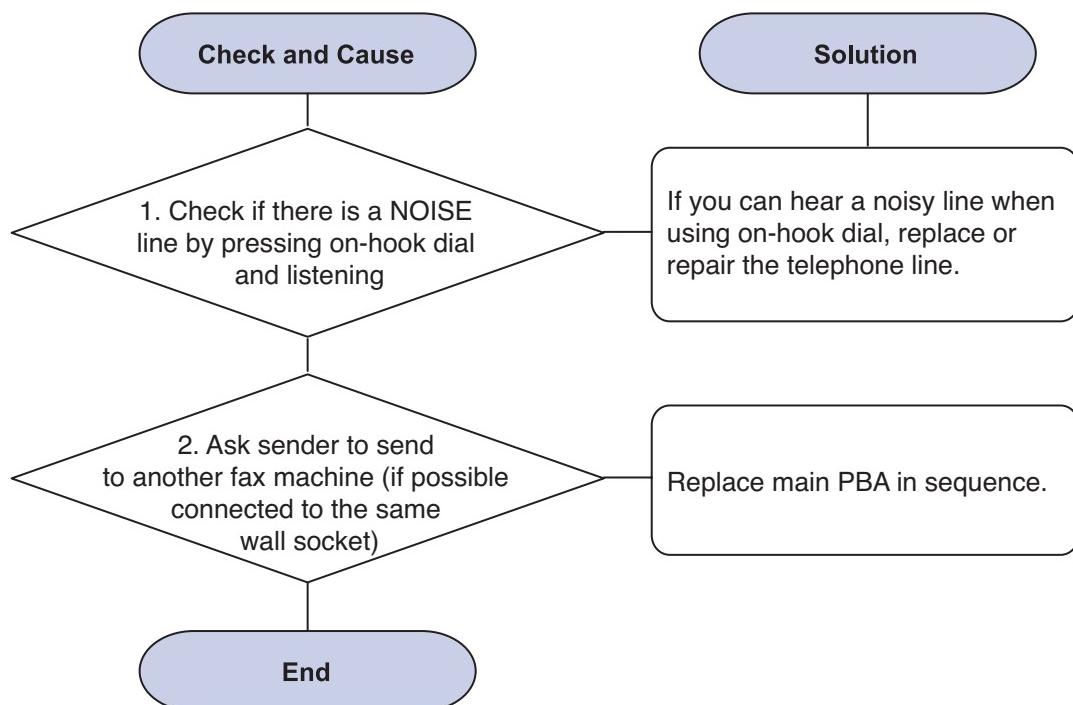
7) Defective FAX RECEIVE (3)

Description: The phone is ringing continuously, but it set does not answer the call.

Check and Cause

Solution

1. Check that the RECEIVE Mode is set to FAX MODE.

If the fault persists even when the RECEIVE Mode is changed to FAX MODE then replace the Main B'd in sequence.

End
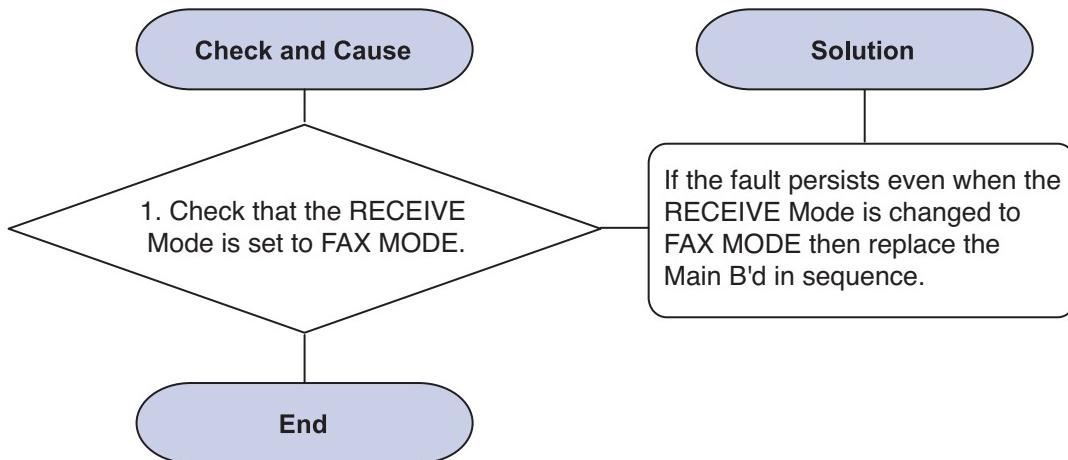
8) Defective FAX RECEIVE (4)

Description: Received data is reduced by more than 50% in the printing.

Check and Cause

Solution

1. Check the FAX status of the forwarding side.

This is a problem with the sending fax machine.
Correct the setting on the remote machine.

End
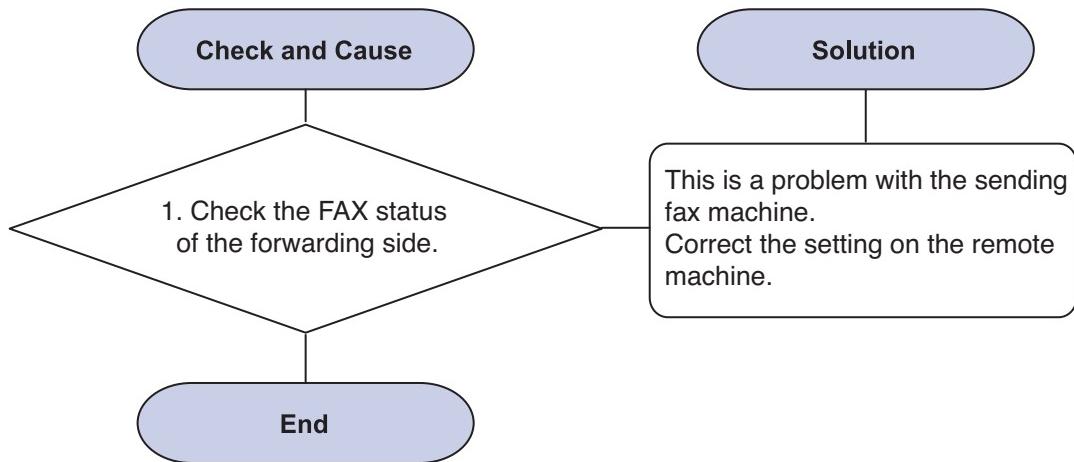
9) Defective Automatic Receiving

Description: The automatic receiving function is not working.

Check and Cause

1. Check that the RECEIVE Mode is set to FAX MODE.

End

Solution

1. If the RECEIVE Mode is set to the TEL MODE, reset it to the FAX MODE.
2. Even after the RECEIVE Mode is changed to the FAX Mode, the problem persists then try to replace the Main B'd in sequence.
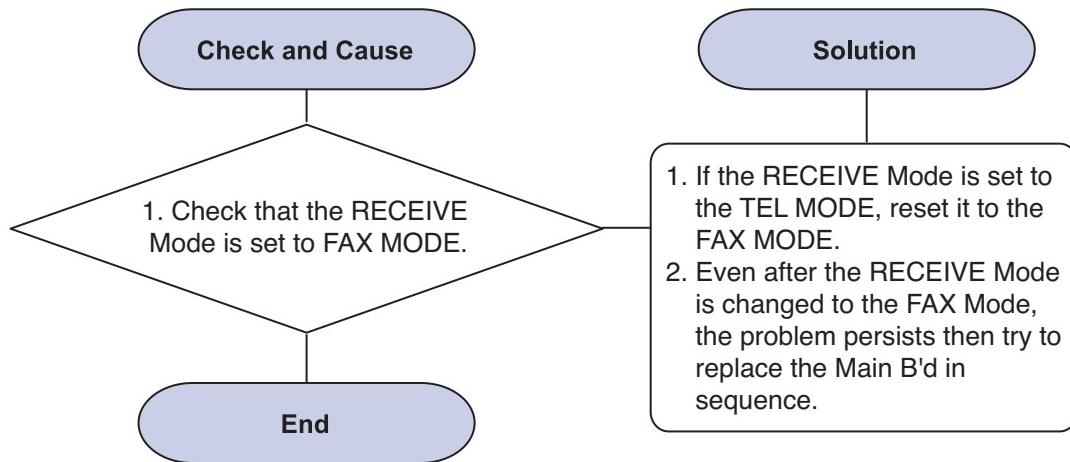
4.2.3 Copy Problems

1) White Copy

Description: Blank page is printed out when copying.

Check and Cause	Solution
1. Check the Scanner Cover is properly closed.	Room light can pass through a thin original.
2. Check shading profile.	Redo shading profile in the tech mode.
3. Check white/black reference voltage on Main PBA. e.q • CIS_SI, CIS_CLK at Chip(U28)	Replace CN8 if it is defective. • U28-Pin6 (CIS_SI) • U28-Pin8 (CIS_CLK)

End
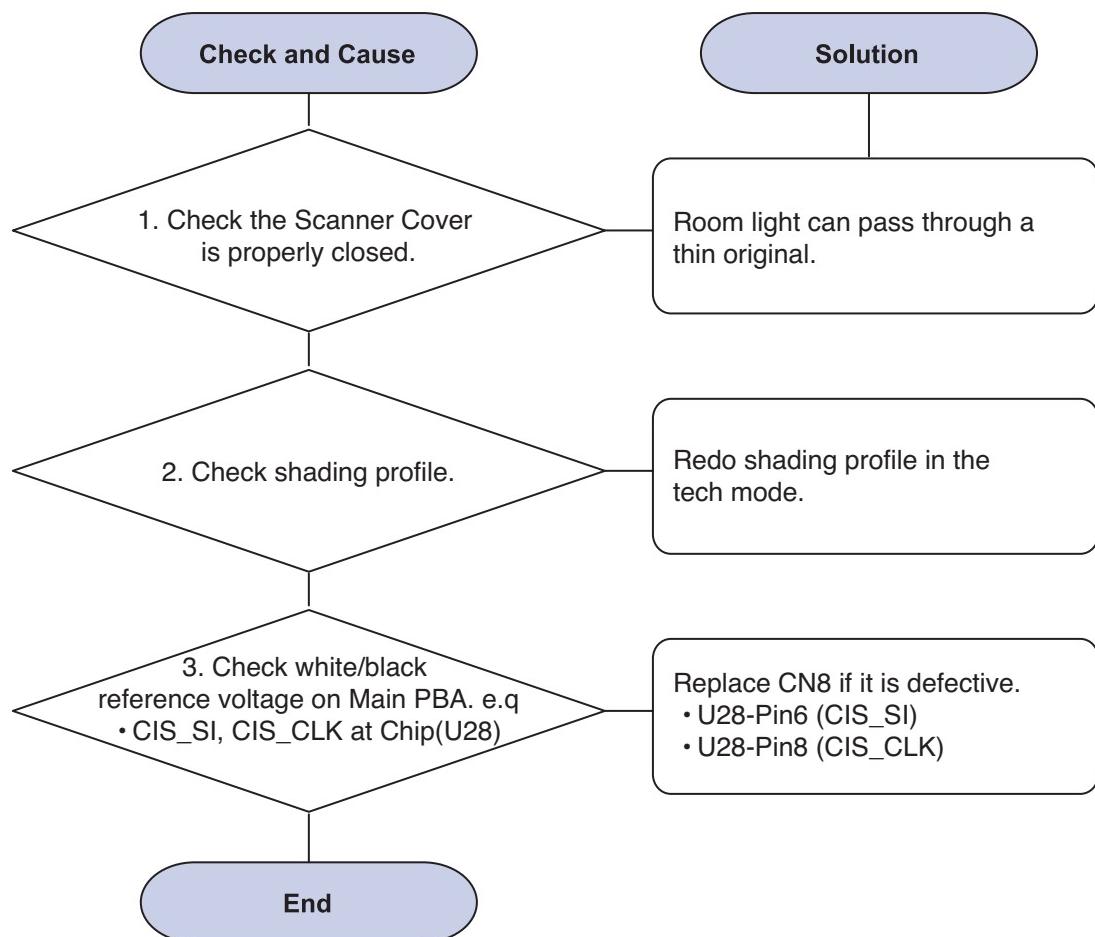
2) Black Copy

Description: Black page is printed out when Copying.

Check and Cause	Solution
1. Check for CIS problem on the Main PBA.	Check the CIS harness is properly connected.
2. Check shading profile.	Redo shading profile in the tech mode.

End
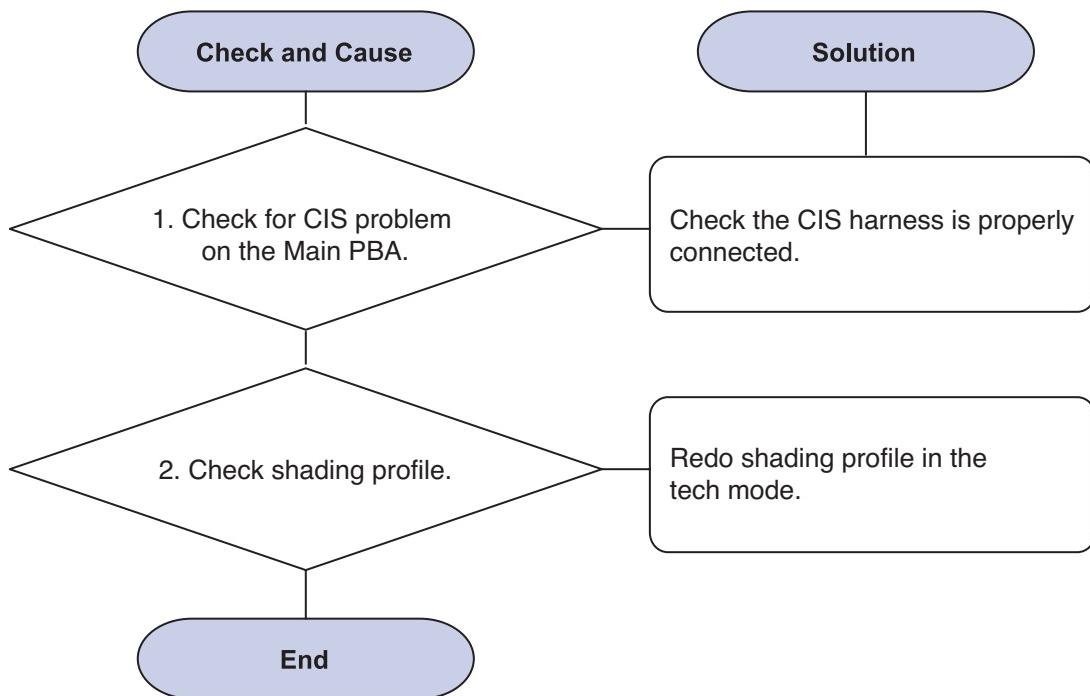
3) Abnormal noise

Description: There is noise from the Platen when copying.

Check and Cause

Solution

1. Check the Scan Motor and gesr.

Check for correct assembly of gear and motor.
Ensure no parts are fouling and there are no foreign objects in the mechanism or scanner path.
Replace any worn parts.

2. Check the Motor Driver on Driver PBA.

Replace the main PBA.

End
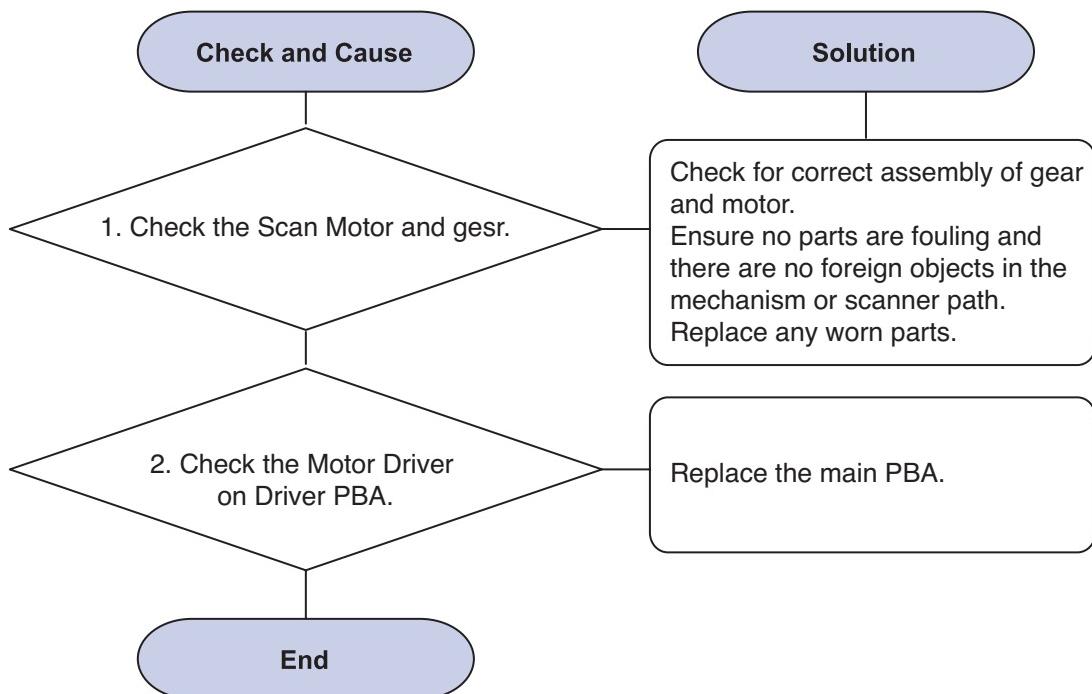
4) Defective Image Quality

Description: The copied image is excessively light or dark

Check and Cause	Solution
1. Check shading profile.	Redo shading profile in the tech mode.
2. Check the gap between original and scanner glass.	A gap of more than 0.5 mm can cause a blurred image. Ensure cover close correctly. Replace as necessary.
3. Check printing quality.	See "Print" troubleshooting

End
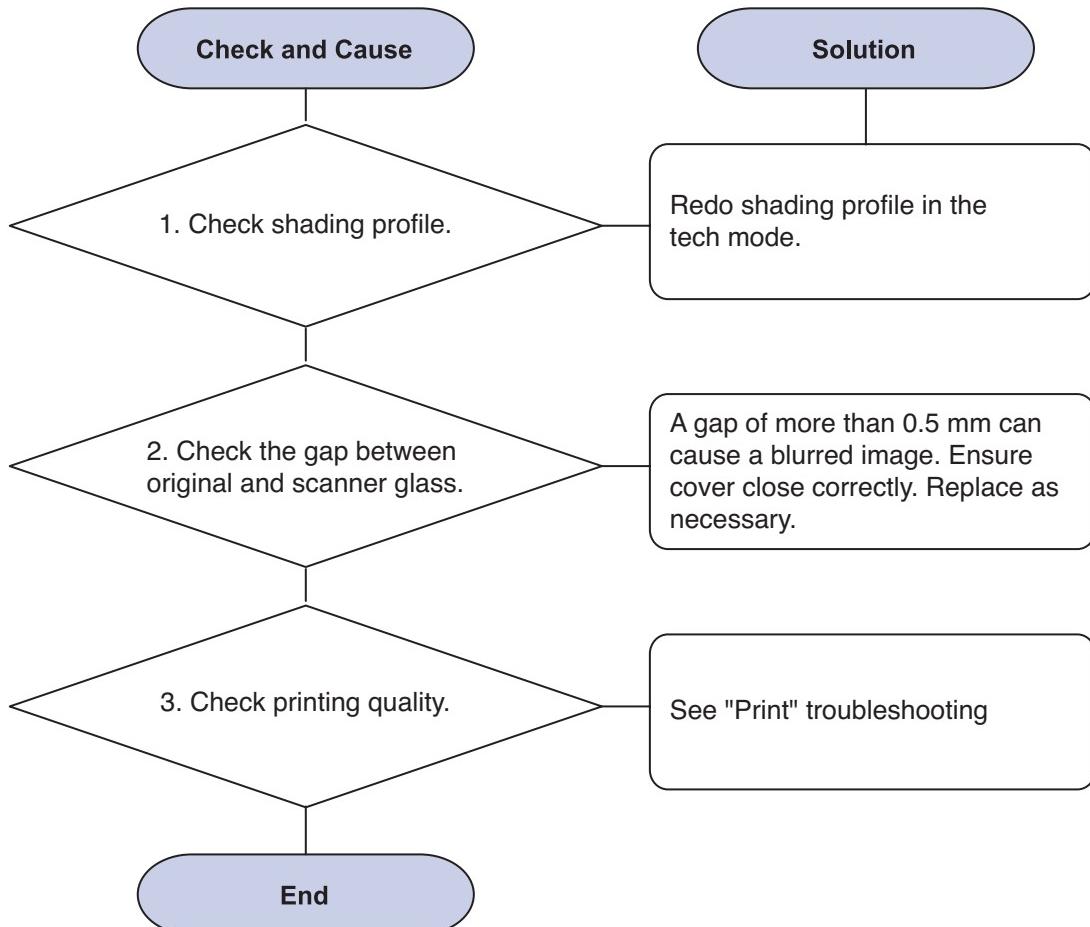
4.2.4 Paper Feed problems – Causes and Solutions

1) Wrong Print Position

Description: Printing begins at wrong position on the paper.

Check and Cause

Wrong sensor timing caused by defective feed sensor actuator.

Solution

Replace the defective actuator

End
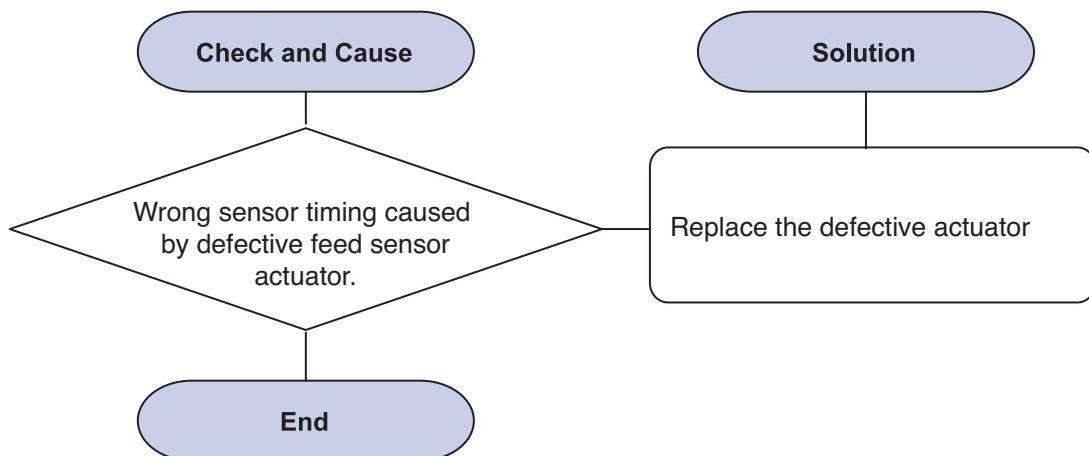
2) JAM 0

Description: 1. Paper is not exited from the cassette.
　　　　　　2. Jam-0 occurs when the paper feeds into the printer

Check and Cause	Solution
1. Check the Solenoid by using Tech Mode.	Replace the solenoid.
2. Check cassette/MP knock-up plate and springs.	Repair / replace as required
3. Check paper separator pad	Clean with soft cloth dampened with IPA (Isopropyl Alcohol) or water. Replace if required.
4. Check the pick up roller for contamination and correct assembly.	Clean with soft cloth dampened with IPA (Isopropyl Alcohol) or water. Replace if required
5. If continuous clusters occur, check all rollers between pickup and registration sensor.	Ensure all rollers are clean and free to operate correctly.

Continue..

Continue..

6. If the paper feeds into the printer and Jam 0 occurs, perform Tech Mode to check feed sensor.

Check the SMPS PBA, Main PBA and all connections.

End

3) JAM 1

Description: 1. Paper is jammed in front of or inside the fuser.
2. Paper is stuck in the exit roller and in the fuser just after passing through the Actuator-Feed.

Check and Cause

Solution

1. If the recording paper is jammed in front of or inside the fuser.

Replace the SMPS or Exit-Sensor.

2. If the recording paper is stuck in the discharge roller and the fuser just after passing through the Actuator-Feed, Feed Actuator may be defective.

1. Replace the Main PBA.
2. Reassemble the Actuator-Feed and Spring-Actuator if the movement is bad.

End

4) JAM 2

Description: 1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.

Check and Cause

Solution

1. If the paper is completely fed out of the printer, but Jam 2 occurs : Exit sensor is defective.

• After the paper is completely discharged, actuator Exit should return to the original position to shut the photo-sensor. Sometimes it takes longer hour than it should and does not return.

Check if the exit sensor actuator is defective.
• Check if the actuator exit is deformed (Check if the lever part is deformed in shape).
• Check whether burrs occur in the assembly part of the actuator exit or not and if the actuator is smoothly operated.
• Check if foreign matter and wire get caught in the actuator exit's operation.

2. If the paper is rolled in the Fuser Roller:

• This occurs when a Guide claw is broken away or transformed.
• It occurs when the Spring of a Guide claw is broken away or transformed.
• It occurs when the Heat-Roller or Pressure-Roller is seriously contaminated with the toner.

If the paper is stuck in the fuser : disassemble the fuser and remove the jammed paper, and clean the surface of the pressure roller with dry gauze.

End

5) Multi-Feeding

Description: Multiple sheets of paper are fed at once.

Check and Cause	Solution
1. Check that the paper size guides are set correctly (cassette and MPF tray).	Adjust paper guides.
2. Solenoid malfunction (the solenoid does not work properly).	Replace the solenoids or PBA as appropriate.
3. Friction Pad is contaminated.	Clean the friction pad rubber with a soft cloth dampened with IPA (Isopropyl Alcohol) or water.
4. Paper has a rough surface texture.	Use paper with a smother surface finish.

End

6) Paper rolled in the fuser

Description: Paper rolled around fuser rollers or 'Concertina' jam

Check and Cause	Solution
1. Contamination of the pressure roller or heat roller.	After disassembling the fuser, clean contamination from between the heat roller and the thermistor and also clean contamination from the pressure roller. Clean the surface of the rollers with IPA or water.
2. Damaged or deformed ribs, claws or springs.	Check for damage or deformation of the print claws and the holder plate claws, and repair or replace as appropriate.

End

7) Paper rolled on the OPC Drum

Description: Paper is rolled up in the OPC.

Check and Cause

Solution

1. Paper is too thin.

Use paper that conforms to the printer specification.

2. The face of paper is curled.

Ensure paper is stored properly to prevent curl.
Note. To remove paper rolled in the OPC.
• Remove the toner cartridge from the set, taking care not to touch the green surface. Use the gearwheel at the side to rotate the OPC drum and pull the paper from the cassette.
• Clean fingerprints on the OPC gently with soft tissue, taking care not to scratch the surface.

End

4.2.5 Printer Faults – Causes and Solutions

1) Fuser Error

Description: A message "Open Heat Error/Over heat/Heating Error' is displayed in the LCD panel.

Check and Cause

Solution

1. Thermostat, fuser power cable or heat lamp is open circuit.

Replace the whole fuser assembly if the thermostat is open circuit.

2. Thermistor is open circuit.

Replace the whole fuser assembly if the thermistor sensor is faulty.

3. Heat lamp ON/OFF test

Replace the fuser.

4. Drive gear melted

End
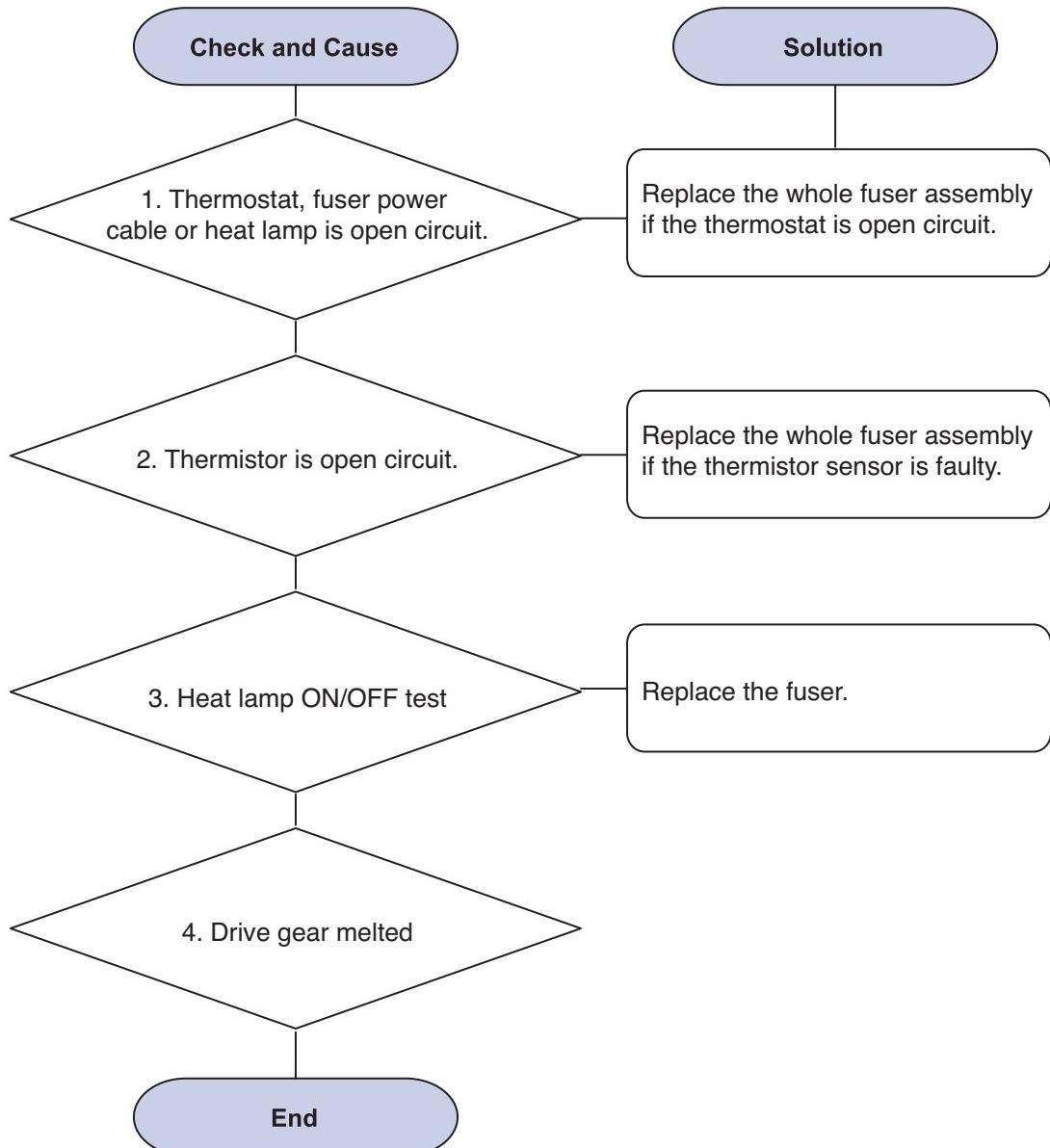
2) LSU Error

Description: A message "LSU Error" is displayed in the LCD panel.

Check and Cause	Solution
1. LSU cable or connector faulty.	Use TECH mode to test the LSU - Replace the LSU - Replace a main board if the same error persists after replacing a LSU.
2. LSU motor is faulty.	Use TECH mode to test the LSU - Replace the LSU - Replace a main board if the same error persists after replacing a LSU.
3. Check the HSYNC signal.	Use TECH mode to test the LSU - Replace the LSU - Replace a main board if the same error persists after replacing a LSU.

End

3) Fuser gear melts due to overheating causing Paper Jam.

Description: Constant Jam where paper is entering Fuser unit.
Fuser rollers do not turn

Check and Cause

Solution

1. Check the Heat Lamp, thermostat and thermistor

Use EDC Mode to test the fuser.

Replace Fuser unit
Replace SMPS or Main PBA as appropriate.

End
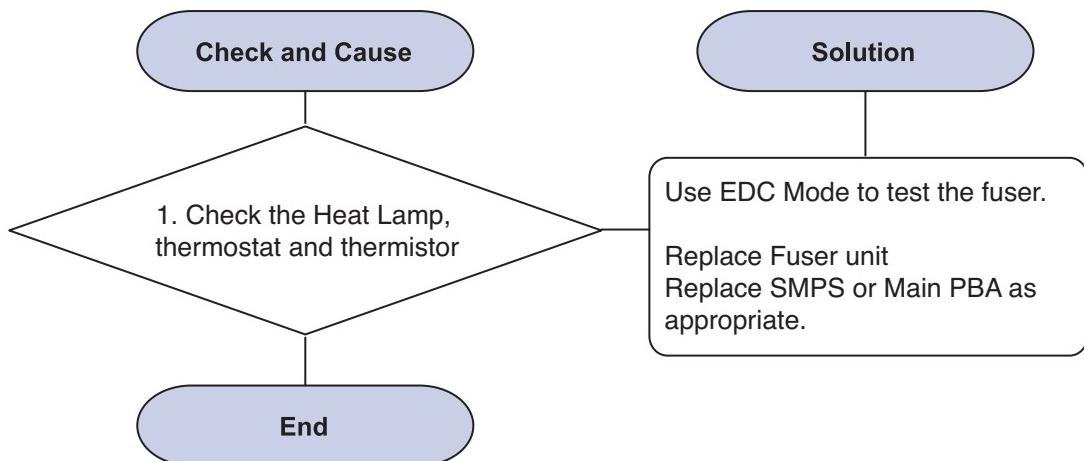
4) Paper Empty

Description: Paper Empty is displayed in the LCD panel even when paper is loaded in the cassette.

Check and Cause	Solution
1. Deformed paper sensor actuator or faulty sensor.	Replace the defective actuator or sensor.
2. SMPS PBA or Main PBA is defective.	Replace the SMPS PBA or MAIN PBA as appropriate.
3. Faulty cables or connectors.	

End
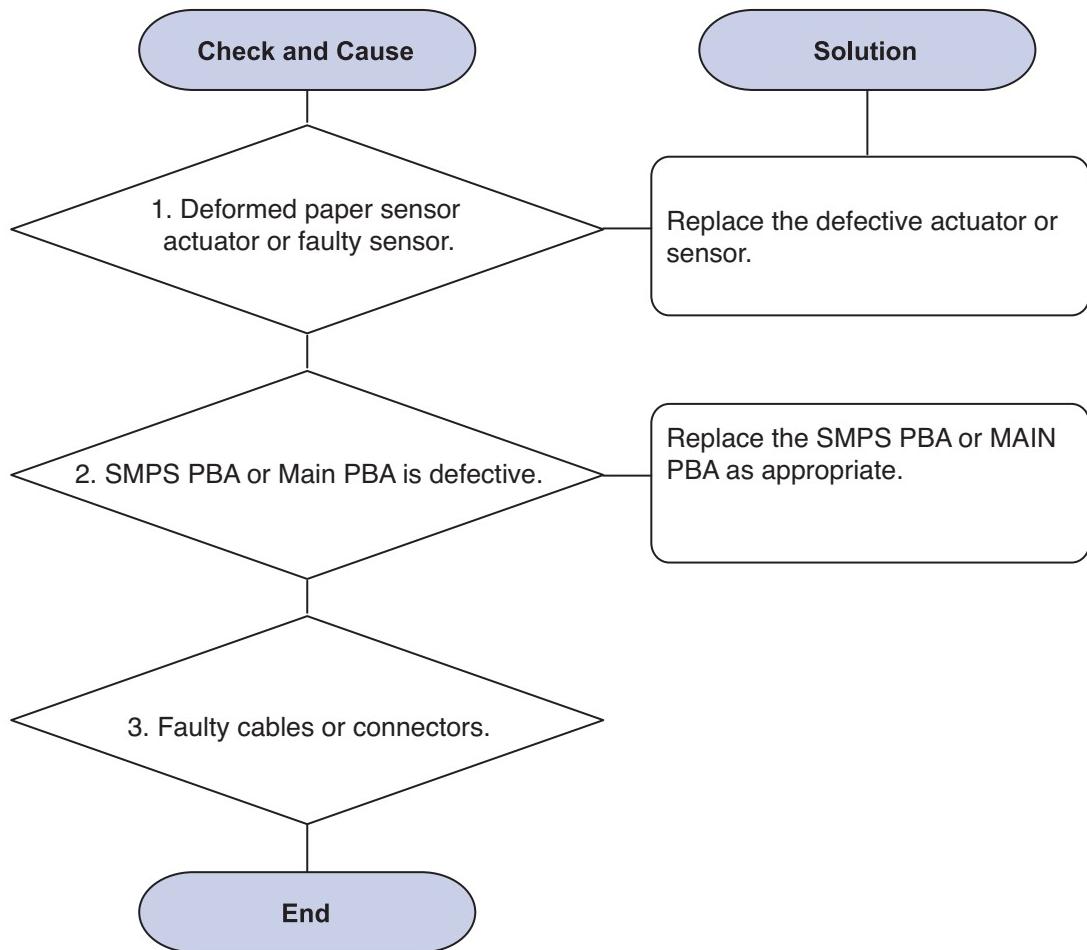
5) Paper Empty without indication

Description: The paper empty message does not appear in the LCD when the paper cassette is empty.

| Check and Cause	Solution
1. Deformed paper sensor actuator or faulty sensor.	Replace the defective actuator.
2. SMPS PBA or Main PBA is defective.	Replace the SMPS PBA or MAIN PBA as appropriate.

End
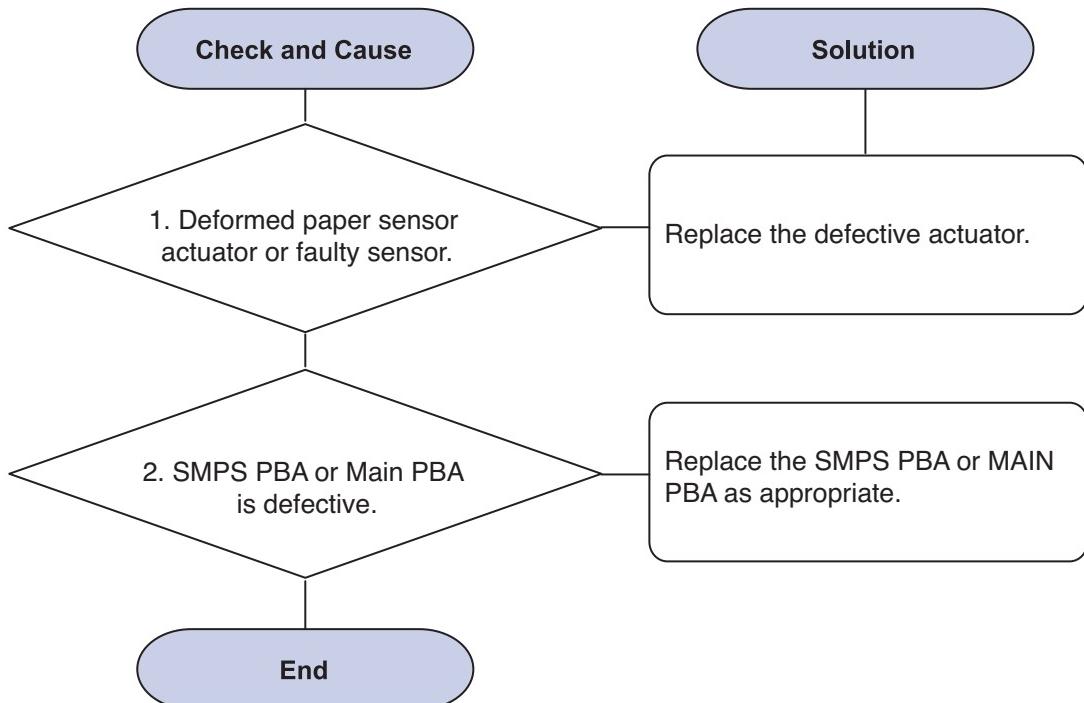
6) Cover Open

Description: The Cover Open message appears on the LCD even when the print cover is closed.

Check and Cause   **Solution**

1. The 'Open Cover' microswitch may be stuck or faulty.

Use TECH mode("cover sensor test") to check cover switch operation. Check and replace switch if necessary.

2. The tab on the front cover may be damaged or broken.

Replace the front cover.

3. Check the connector and cables between Switch and main PBA.

Replace the Main Control board or Cover Open S/W as necessary.

End

7) No error message when the cover is open

Description: The Cover Open message does not appears on the LCD even when the print cover is open.

Check and Cause

Solution

1. The 'Open Cover' microswitch may be stuck or faulty.

Use TECH mode("cover sensor test") to check cover switch operation. Check and replace switch if necessary.

2. Check the connector and cables between Switch and main PBA.

Replace the Main Control board or Cover Open S/W as necessary.

End
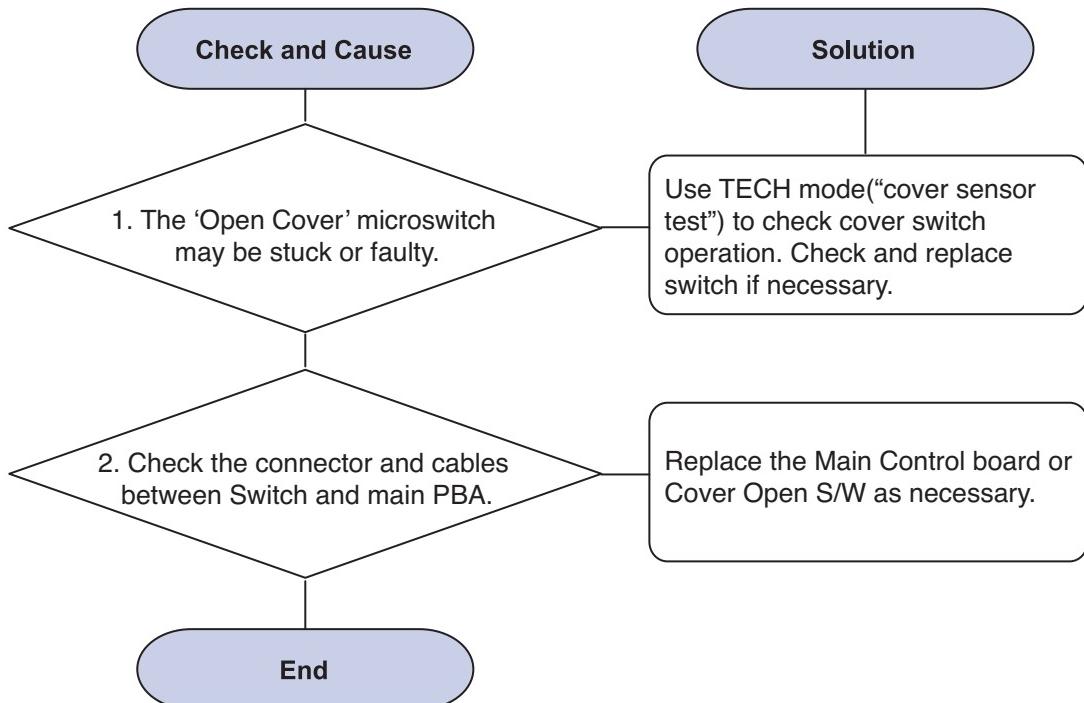
8) Defective motor operation

Description: Main motor is faulty and paper does not feed into the printer, resulting in Jam 0'

Check and Cause

1. The main motor harness or Motor PCB may be faulty.

End

Solution

Check the motor harnesses and connectors, replace if defective.. If the problem persists replace the main PBA.

Note. Check motor operation using EDC Mode.
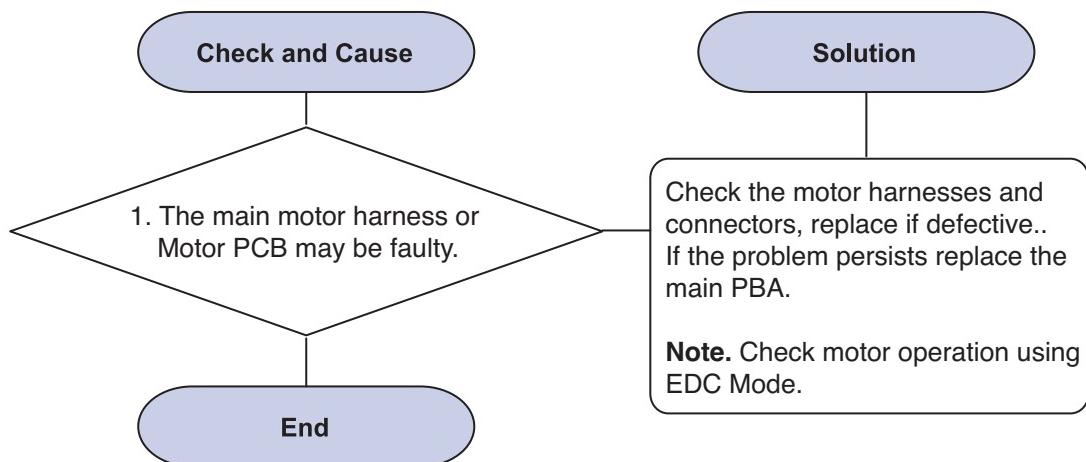
9) No Power

Description: When system power is turned on the LCD panel does not come on.

Check and Cause

Solution

1. Check if the power input and SMPS output are normal.

Replace the power supply cord or SMPS. Check power fuse and SMPS fuses replace if necessary.

2. LCD panel does not come on but normal start up sounds are heard.

Replace the OP panel.

3. After replacing SMPS display does not come on and no start up sounds are heard.

Replace the main PBA panel.

End
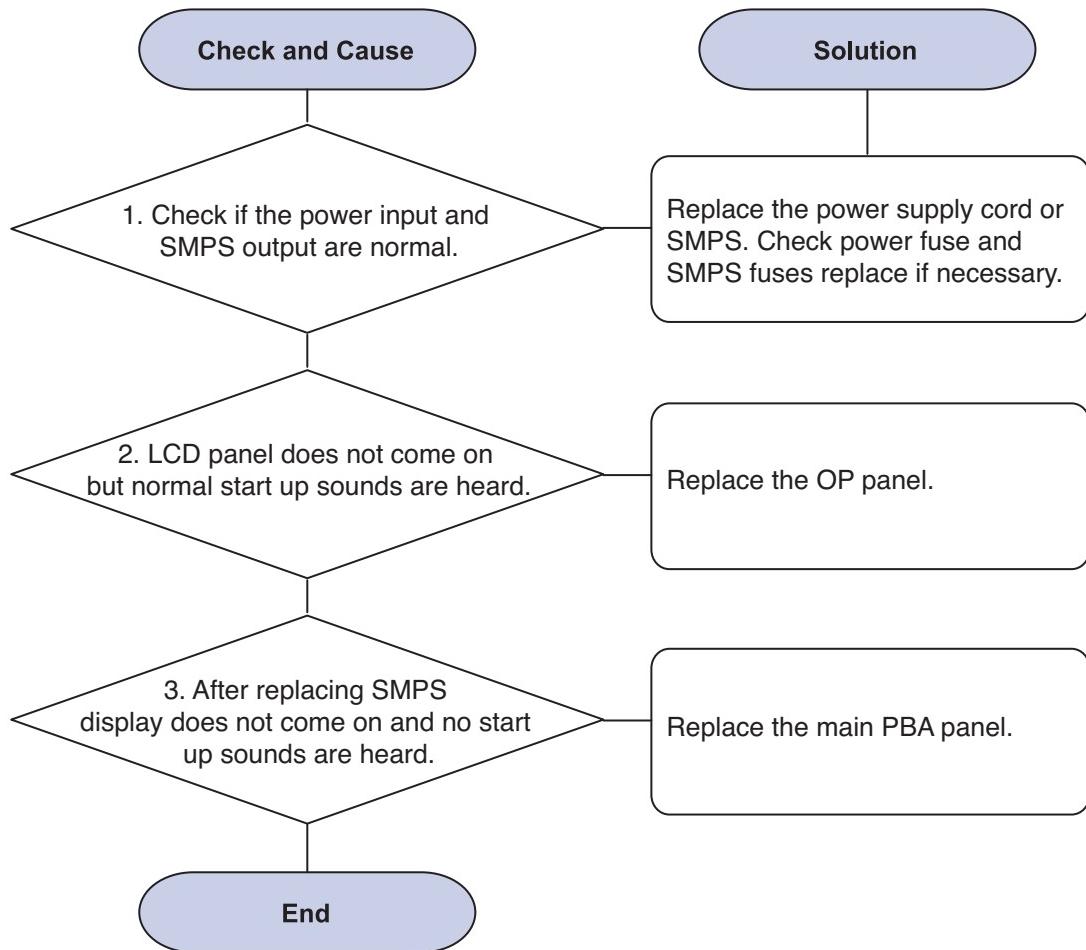
10) Printed Vertical Lines become curved

Description: When printing, vertical lines are not straight.

Check and Cause

Solution

1. Check stability of 24V supply to LSU.

24V stable - Replace LSU.
24V unstable replace SMPS, if the problem persists replace the main PBA.

End
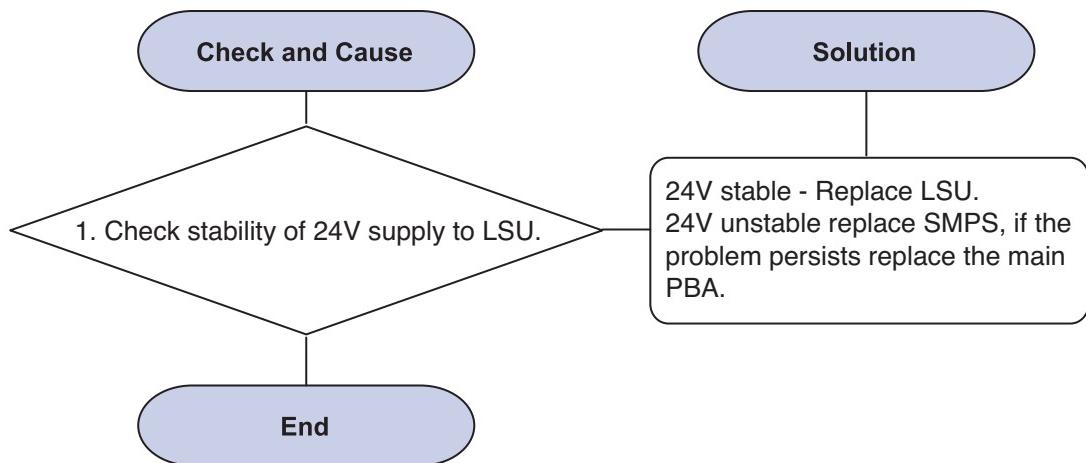
4.2.6 Toner Cartridge Service

Only authorized toner cartridges should be used. Printing defects or set damage caused by the use of non-approved toner cartridges or un-licensed toner refills are not covered by the guarantee.

4.2.6.1 Precautions on Safe-keeping of Toner Cartridge

Excessive exposure to direct light for more than a few minutes may cause damage to the cartridge.

4.2.6.2 Service for the Life of Toner Cartridge

If the printed image is light due to the toner supply becoming low you can temporarily improve the print quality by redistributing the toner (Shake the toner cartridge), however you should replace the toner cartridge to solve the problem permanently.

4.2.6.2(a) Redistributing Toner

When the toner cartridge is near the end of its life, white streaks or light print occurs. The LCD displays the warning message, "Toner Low." You can temporarily reestablish the print quality by redistributing the remaining toner in the cartridge.

1. Open the Front Cover.
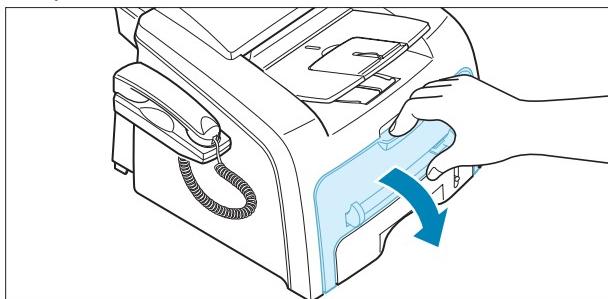
2. Lightly pushing the used cartridge down, pull it out.
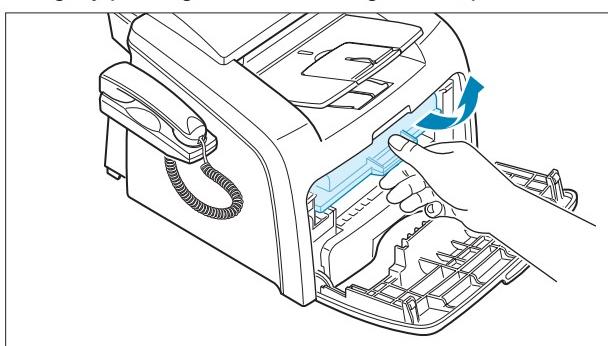
Note : Help the environment by recycling your used toner cartridge. Refer to the recycling brochure packed with the toner cartridge for details.

3. Unpack the new toner cartridge and gently shake it horizontally four or five times to distribute the toner evenly inside the cartridge.
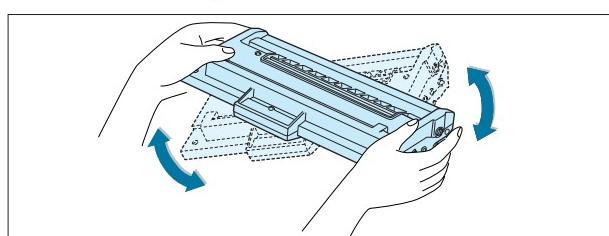
4. Save the box and the cover for shipping. Slide the new toner cartridge in until it locks into place.
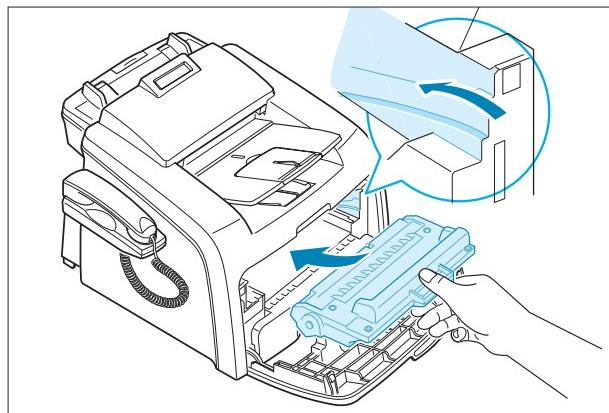
4.2.6.3 Standard of guarantee for consumable parts.

Please refer to User's Manual or Instructions on Fax/Printer Consumables SVC manual for the criteria for judging the quality of consumable parts the standard of guarantee on those parts.

• **Spotting a refilled cartridge by eye.**
One way security screws are used in the manufacture of the cartridge – check if these are damaged.

4.2.6.4 Error messages in the LCD window related to toner.

This section explains messages on the LCD that are related to the data stored in the EEPROM in the toner cartridge.

4.2.6.4(a) Toner Low
- Explanation: The amount of toner remaining is less than 10%
- Solution: The cartridge is almost empty or life-expired – replace the cartridge.

4.2.6.4(b) Toner Empty
- Explanation: The toner cartridge is empty
- Solution: Replace the cartridge.

4.2.6.4(c) Drum Warning
- Explanation: This message appears when the OPC drum is nearing the end of its life (14,000pages). This means that the life of the mechanical parts in the cartridge has expired (this is not an indication of toner remaining).
- Solution: After printing about 15,000 pages, in a worst case scenario, the waste toner collector might overflow and it may cause the system to fail. Also after 15,000 pages the OPC drum surface will be becoming worn and print quality will degrade, print images will become misty. It is therefore necessary to replace the cartridge even though there may be toner left in it.
  When this message occurs there are approximately 1,000 pages left.

4.2.6.4(d) Replace Drum
- Explanation: The toner cartridge mechanical life is expired.
- Solution: Replace the cartridge.

4.2.6.5 Signs and Measures of Poor toner cartridge

| Fault	Signs	Cause & Check	Solution
Light image and partially blank image (Cartridge life is ended.) Digital Printer Digital Printer Digital Printer Digital Printer Digital Printer	• The printed image is light or dirty and untidy. • Parts of the image are not printed. • Periodically a "tick tick" noise occurs.	1. If the image is light or dirty and untidy - Shake the toner cartridge and then recheck. OK: Lack of toner, so the life is nearly expired. 2. Some part of image is not printed - Shake the toner cartridge and then recheck. (1)NG: clean the LSU window with a cotton swab, then recheck. (2)OK: Lack of toner, so the life is nearly closed. 3. Periodically a noise like "tick tick" occurs - Measure the time between ticks. 4. White vertical stripes on the whole or part of the page : Shake the toner cartridge and then recheck. OK: Lack of toner, so the life is nearly expired	1. All of 1, 2, 3 If image quality improves by shaking, replace with a new toner cartridge. Perhaps up to 100 pages left before out of toner. 2. For item 2- If image quality improves after cleaning the LSU window then the toner cartridge is normal. (Contamination on the LSU window has caused image quality problems.) 3. For item 3- If the time between ticks is about 2 seconds, the toner inside the toner cartridge is almost exhausted. (Purchase and replace with a new toner cartridge. Perhaps up to 200 pages left before out of toner) 4. For item 3- This is a phenomenon caused by lack of toner, so replace the toner cartridge.
Toner Contamination	• Toner contamination of the printed page at regular intervals down the page. • Random Toner contamination over the whole or large parts of the paper surface.	1. Contamination at regular intervals. (a)Check the distance between contamination marks. (b)Check the appearance of both ends of the toner cartridge OPC drum. 2. Random page contamination. (a) Check that the terminals (contact points) of the toner cartridge and the set are clean. (b) Check that the terminals (contact points) of the toner cartridge and the set are not damaged.	1.(a) Refer to section 6.5 1.(b) If both ends of the OPC drum are contaminated with toner: Check no. of pages printed using this cartridge – perhaps waste toner collector is full. 2. Clean all HV contacts. If the problem persists replace the cartridge.

Fault	Signs	Cause & Check	Solution
White Black spot Digital Printer Digital Printer Digital Printer Digital Printer Digital Printer	• Light or dark black dots on the image occur periodically. • White spots occur in the image periodically.	1. If light or dark black dots occur at regular intervals this is because the toner cartridge rollers are contaminated with foreign substance or paper particles. (1)38mm interval : Charge roller (2)95mm interval : OPC cycle 2. If white spots occur in a black image at intervals of 95mm, or black spots occur elsewhere, the OPC drum is damaged or foreign substance is stuck to the surface. 3. If a black and white or graphic image is partially broken at irregular intervals, the transfer roller's life has been expired or the transfer voltage is abnormal.	1. For item 1 - Run OPC Cleaning Mode Print 4-5 times repeatedly to remove excess toner. Especially check for foreign substances on the OPC surface Clean with a clean gauze moistened with IPA Isopropyl Alcohol) take care not to damage the OPC surface. ⚠ Never use other forms of alcohol. 2. For Item 2 - If running OPC Cleaning Mode Print 4-5 times does not resolve the problem : at intervals of 37.7mm - place the toner cartridge. : at intervals of 75.5mm – clean OPC drum. 3. For item 3 - Change the transfer roller because the life of the transfer roller has expired. (Check the transfer voltage and readjust if necessary.)
Recycled product	• Poor appearance of the toner cartridge. • Dirty or rough printouts. • Bad background in the image.	1. Poor appearance of the toner cartridge. (a)Check for damage to label and if different materials are used. (b)Check the appearance of parts of the toner cartridge, such as frame, hopper, screws 2. Unclean and rough printouts. (a)Check that the terminals (contact point) of the toner cartridge and the set are clean. (b)Check that the terminals (contact point) of the toner cartridge and the set are not damaged.	1. For Item 1 the cartridge is judged to be a recycled product - (a) If there is any evidence of disassembling the toner cartridge. (b) If materials other than normal parts of the toner cartridge are added or substituted. 2. Clean all HV contacts. If the problem persists replace the cartridge. **Note** If the cartridge is judged to be recycled then these types of problems can occur when the toner cartridge is recycled over 2 times. If 'nearly empty' cartridges are collected for re-use this is judged as recycling the toner cartridge.

Fault	Signs	Cause & Check	Solution
Ghost & Image Contamination	• The printed image is too light or dark, or partially contaminated black. • Totally contaminated black. (Black image printed out) • The density of printouts is too dark and ghost occurs.	1. The printed image is too light or dark, or partially contaminated black. (a) Check if foreign substance or toner are stuck to the terminals (point of contact) of the toner cartridge or set. (b) Check if the terminal assembly is normal. 2. Totally contaminated black. (Black image printed out) (a) Check if foreign substances are stuck to the terminal (point of contact) of the toner cartridge or set. (b) Check if the terminal assembly is normal. (Especially check the charge roller terminal.) 3. The printed image is dark and ghost occurs. (a) Check if foreign substances are stuck to the terminal (point of contact) of the toner cartridge or set. (b) Check if the terminal assembly is normal. (Especially check the developer roller terminal.)	1. All of Items 1, 2, 3 (a) Clean the contacts on the toner cartridge. (b) Clean the contact points on the set. (c) If the terminal assembly is damaged repair or replace the terminals in the set or replace the cartridge 2. In Item 2 This is particularly related to problems with the charge roller contact. Pay close attention to the charge roller contacts. 3. In Item 3 This is particularly related to problems with the developer bias voltage contact. Pay close attention to the charge roller contacts.

4.2.7 Software Problems – Causes and Solutions

1) The printer is not working (1)

Description: While Power turned on, the printer is not working in the printing mode.

| Check and Cause	Solution
1. Run Self-Test Mode: using the menu buttons print the test page. (Menu, Enter, Enter).	If the test print works that means there are no problems in the printer itself. If the test printing does not work that means the printer is faulty and the problem is not due to computer software or driver settings.
2. Check that the PC and the printer are properly connected and that the toner cartridge installed correctly.	Replace the printer cable. If the problem is not solved even after the cable is replaced, check the amount of the remaining toner.
3. Check that the printer cable is directly connected to the printer.	If you have other devices that need to share the printer port try temporarily disconnecting these devices 9and perhaps even uninstalling their drivers) to ensure the printer works by itself. If you are using a USB hub try connecting directly to the back of the PC instead.

End

2) Abnormal Printing

Description: Printing does not work – even after replacing the cable
Printer does not work at all or strange fonts are printed,

Check and Cause

Solution

1. Set up the parallel port using CMOS SETUP.

Ensure that ECP (best) or SPP is selected in the CMOS (BIOS) setup.

2. Printer Driver Error.

Ensure that the correct driver is loaded. Use the driver supplied on the CD or downloaded from the web site.
DO NOT use the Microsoft driver supplied with the Windows operating system. If the printer is a GDI or SPL type printer ensure that ALL OTHER GDI or SPL drivers are uninstalled as Windows allows only 1 of this type of driver to be loaded.

3. Error message "insufficient memory".
(The printing job sometimes stops due to insufficient virtual memory, this is caused by insufficient space on the hard disk.)

Delete any unnecessary files to secure enough space on the hard disk and start the print job again.

End

3) SPOOL Error

Description: SPOOL (simultaneous peripheral operations online) is the process Windows uses to manage print jobs. Jobs are processed and then stored on the hard disk until the printer is ready to accept them

Check and Cause	Solution
1. Insufficient space on the hard disk in the directory assigned for the basic spool.	Delete any unnecessary files to provide more space for spool storage.
2. If previous printing errors were not solved.	There may be files from previous failed print jobs on the hard disk with the name in the form '*.jnl'. Delete these files and Reboot Windows to restart the printer.
3. There may be conflict with other drivers or programs.	Shut down all other programs except the current one, if possible.
4. When an application program or the printer driver is damaged.	Delete the printer driver completely and reinstall it.
5. When some files related to the OS are damaged or virus infected.	After rebooting the computer, check for viruses, restore the damaged files and reinstall the application program which is not working properly.

Continue..

Continue..

6. Memory is less than suggested.

Add up more memory to the PC.

End

⚠ **How to delete the data in the spool manager.**

In the spool manager, the installed drivers and the list of the documents waiting to be printed are shown.
Select the document to be deleted and check delete in the menu.

If the job you are deleting is the current job when you delete the job data that has already been transferred to the printer's memory will still be printed.
If there is a problem with the printer (out of toner, offline, out of paper etc.) the job may take a long time to delete as it must wait for a time out.

# 5. Exploded Views and Parts List

Contents

DIGITAL LASER MFP

Contents

1. **Precautions**

2. **Product spec and feature**

3. **Disassembly and Reassembly**

4. **Alignment & Troubleshooting**

5. **ExplodedView and Parts list**

6. **System Diagram**

7. **Reference Information**

5.1 Main Exploded View
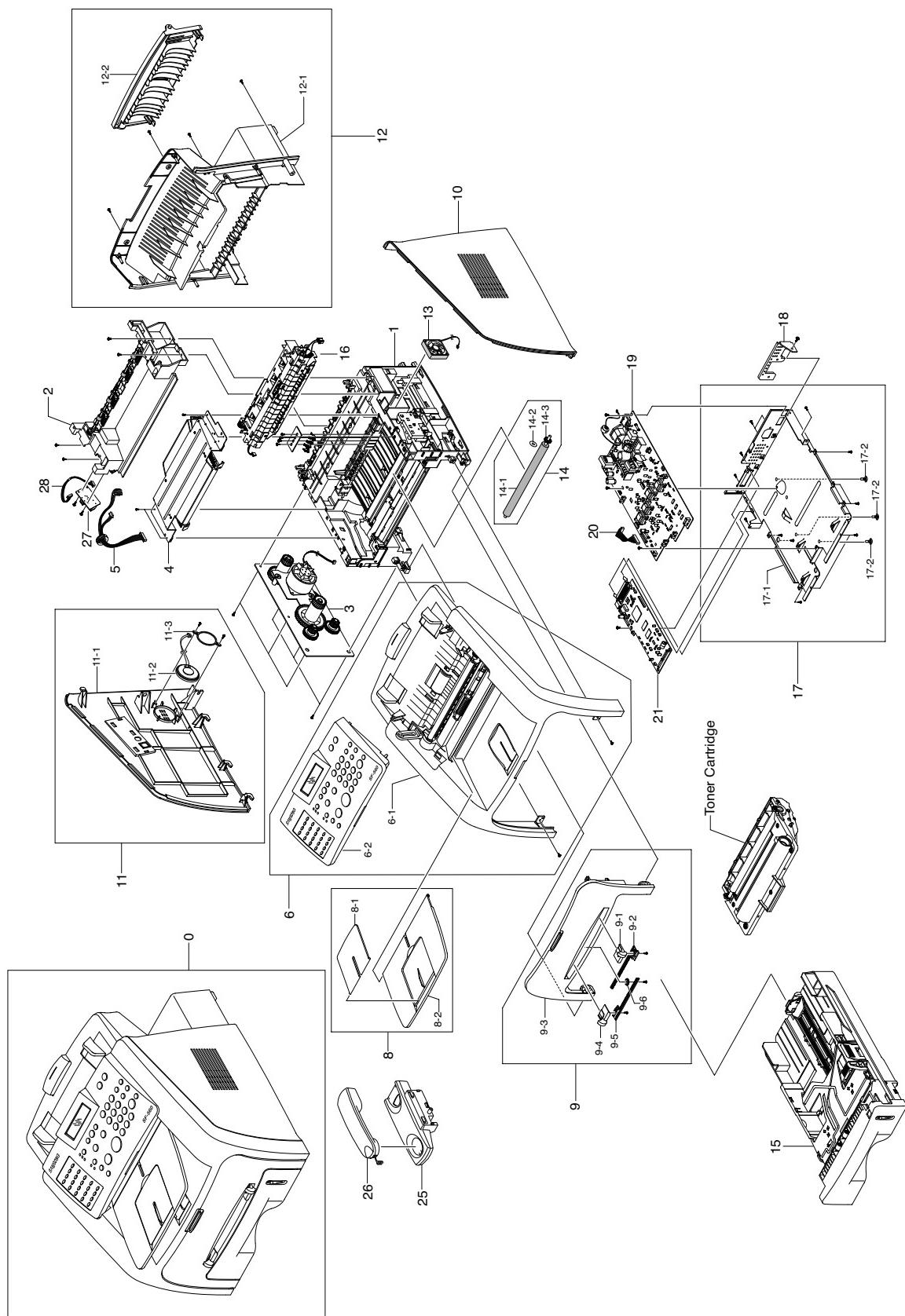
5.2 Top Cover Exploded View
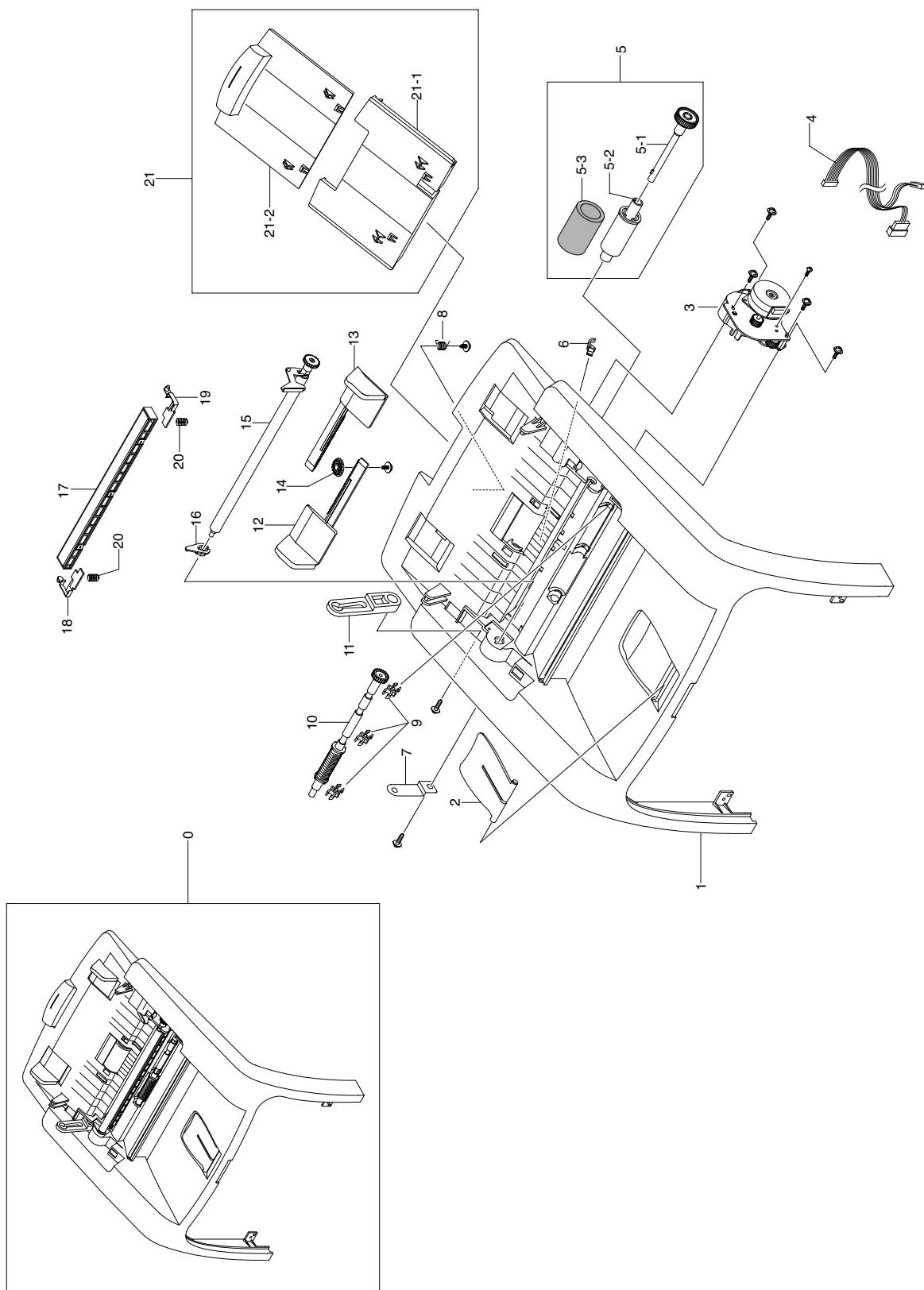
# 5.3 OPE Ass'y Exploded View
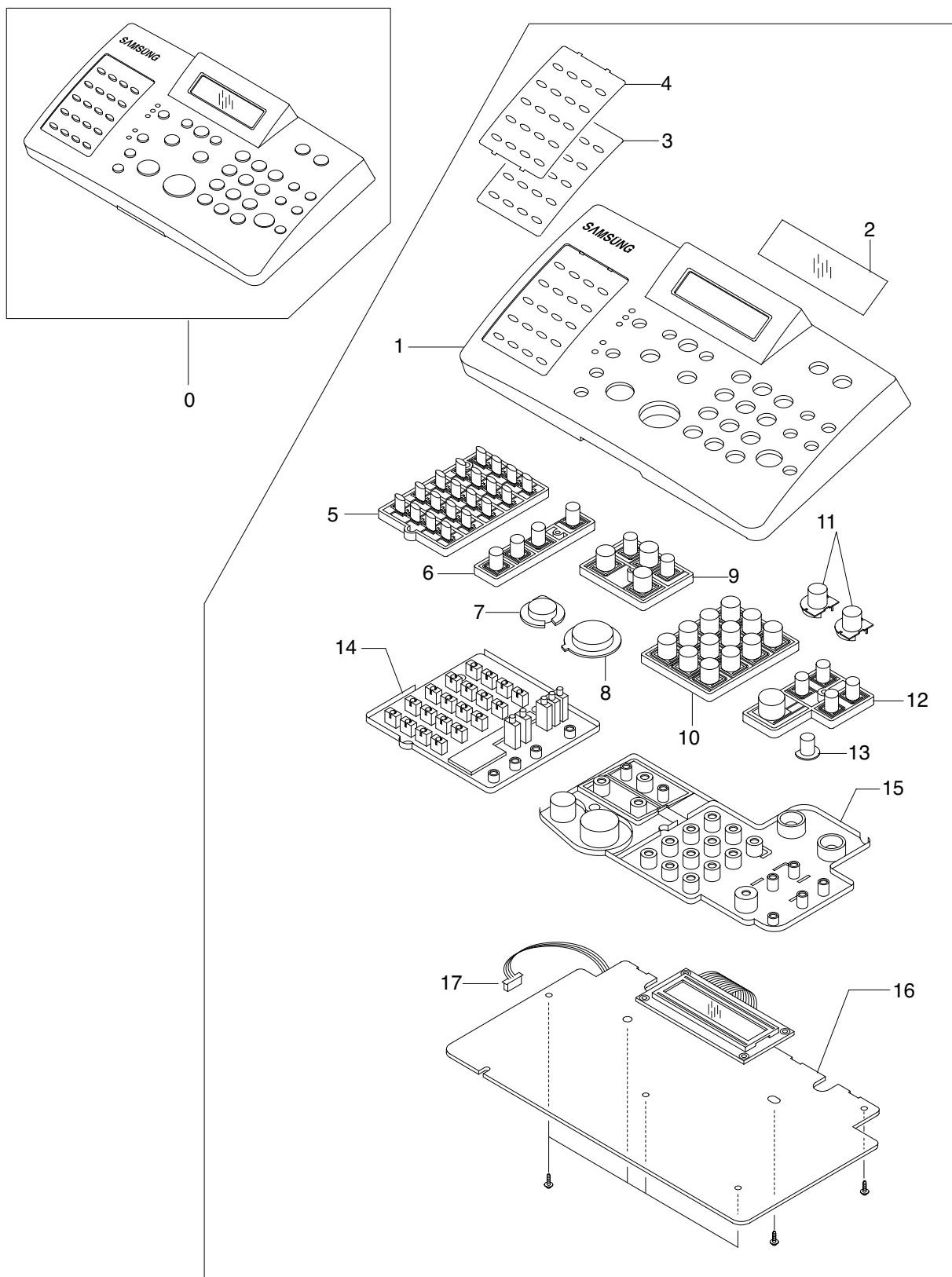
5.4 Scan Upper Ass'y Exploded View
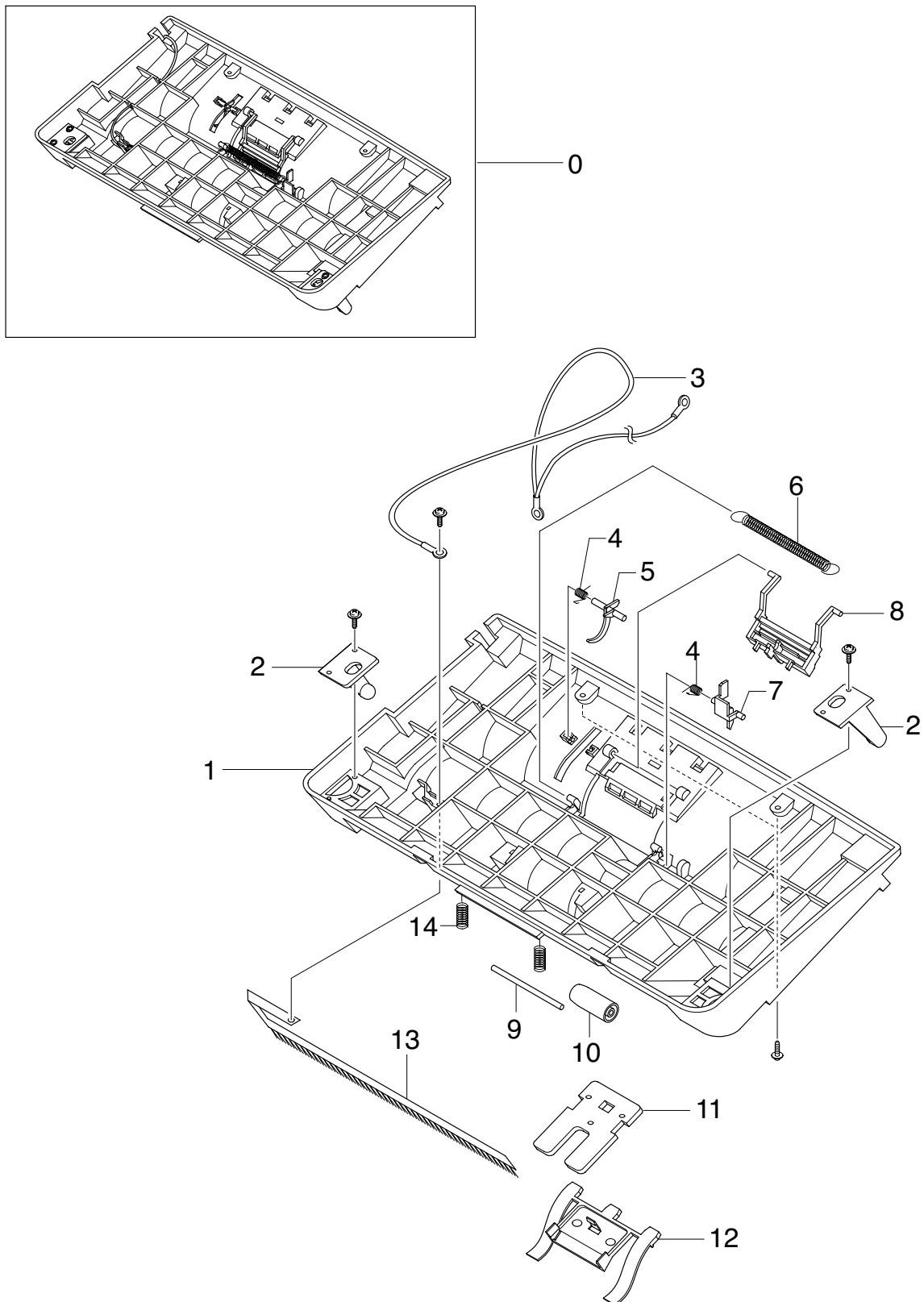
5.5 Main Frame Exploded View

Transfer Roller
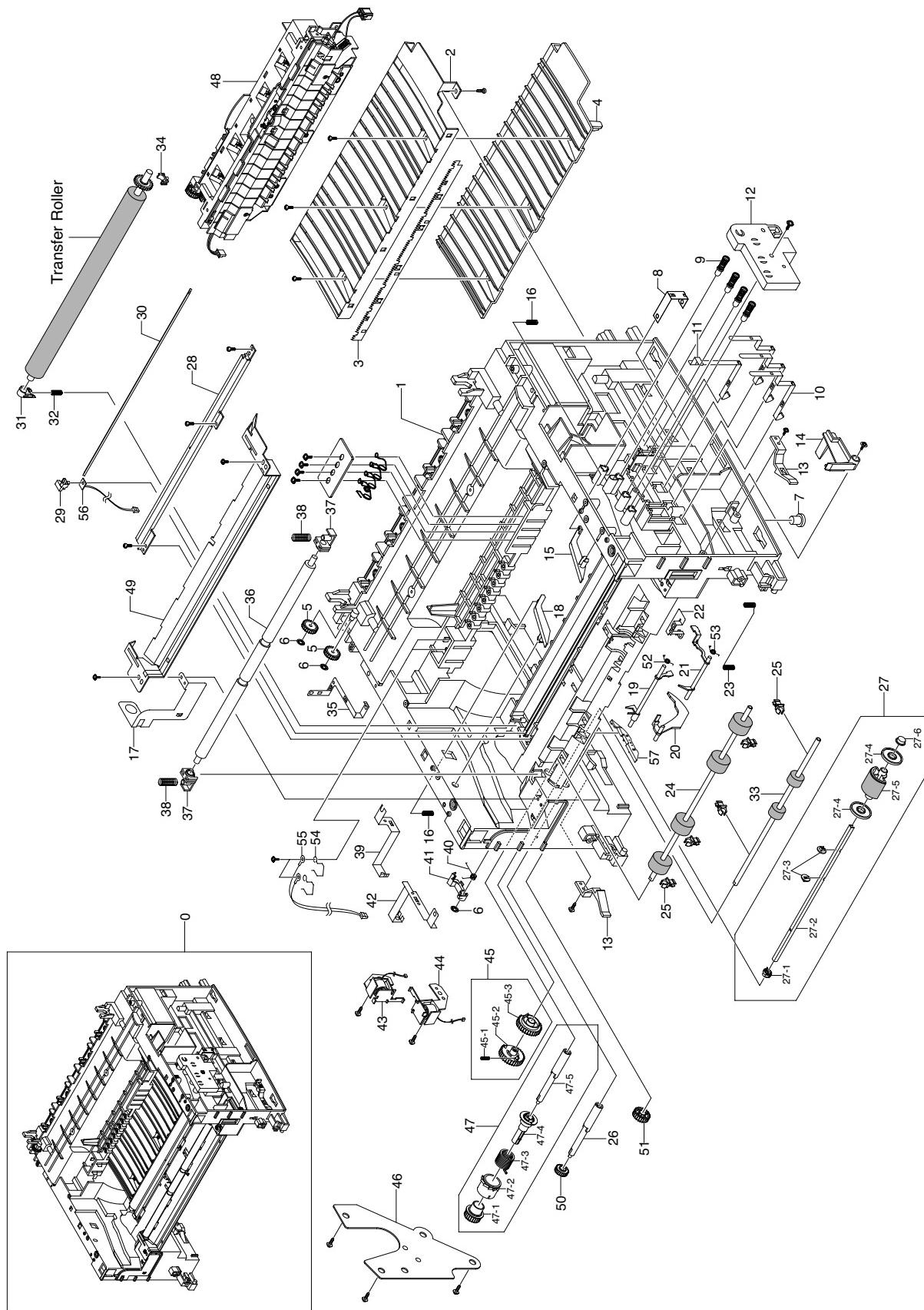
# 5.6 Fuser Unit Exploded View
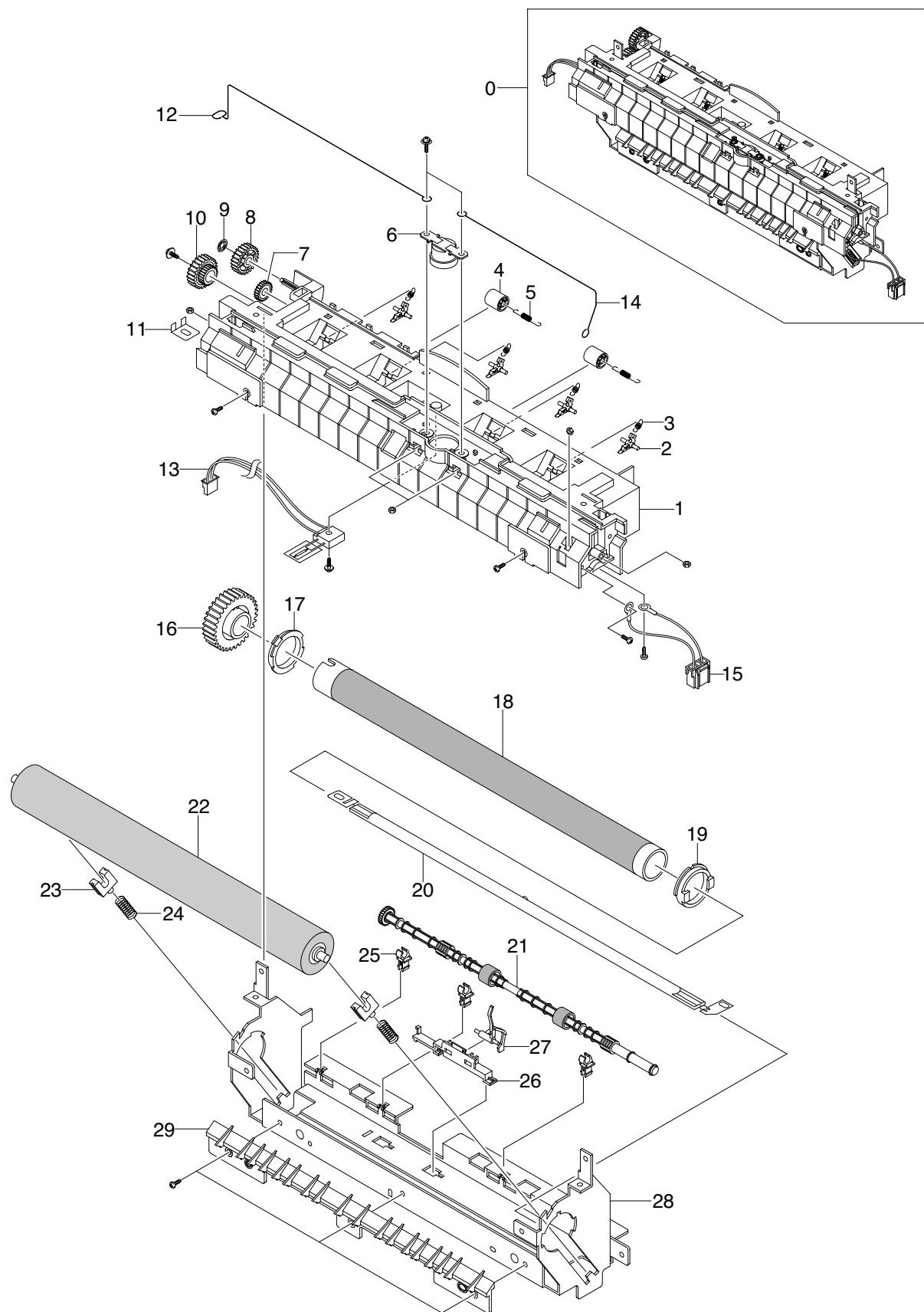
5.7 Exit Cover Exploded View
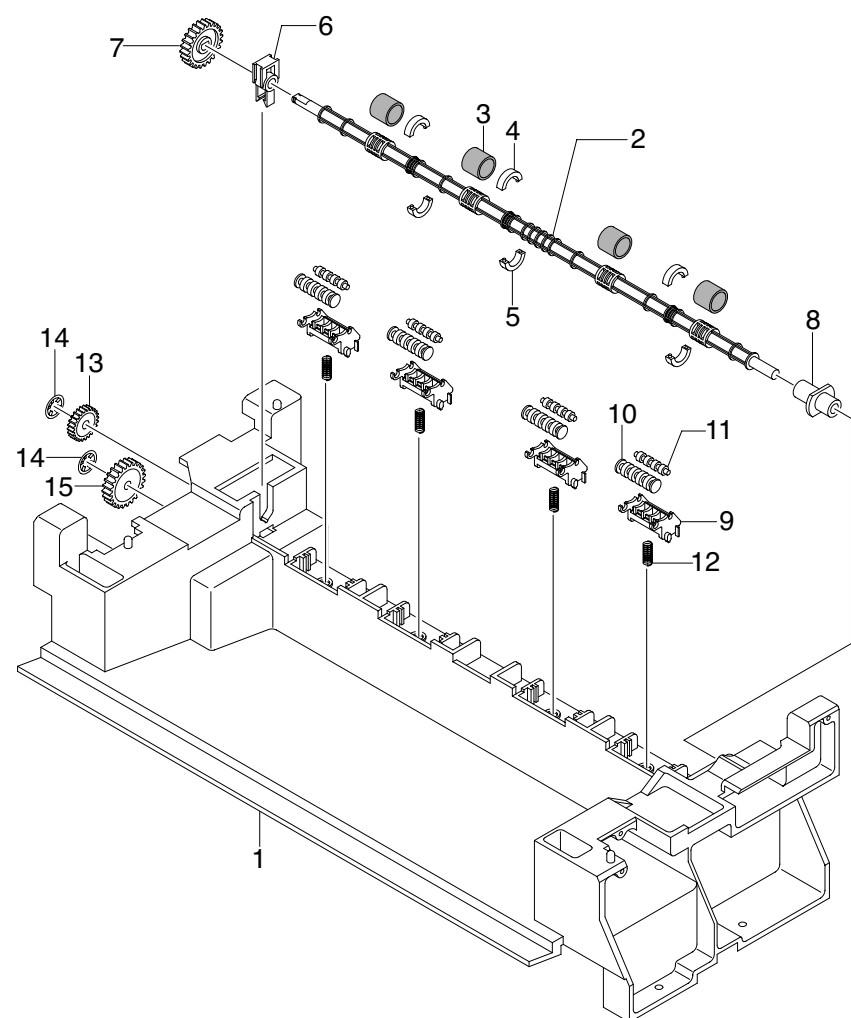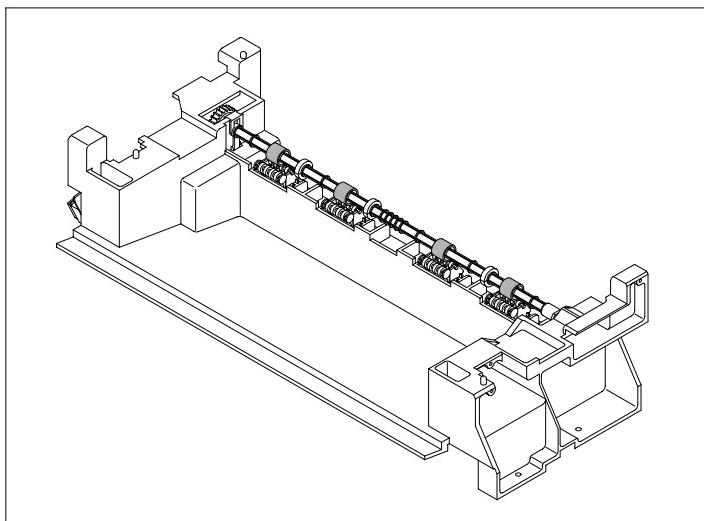
5.8 Cassette Unit Exploded View
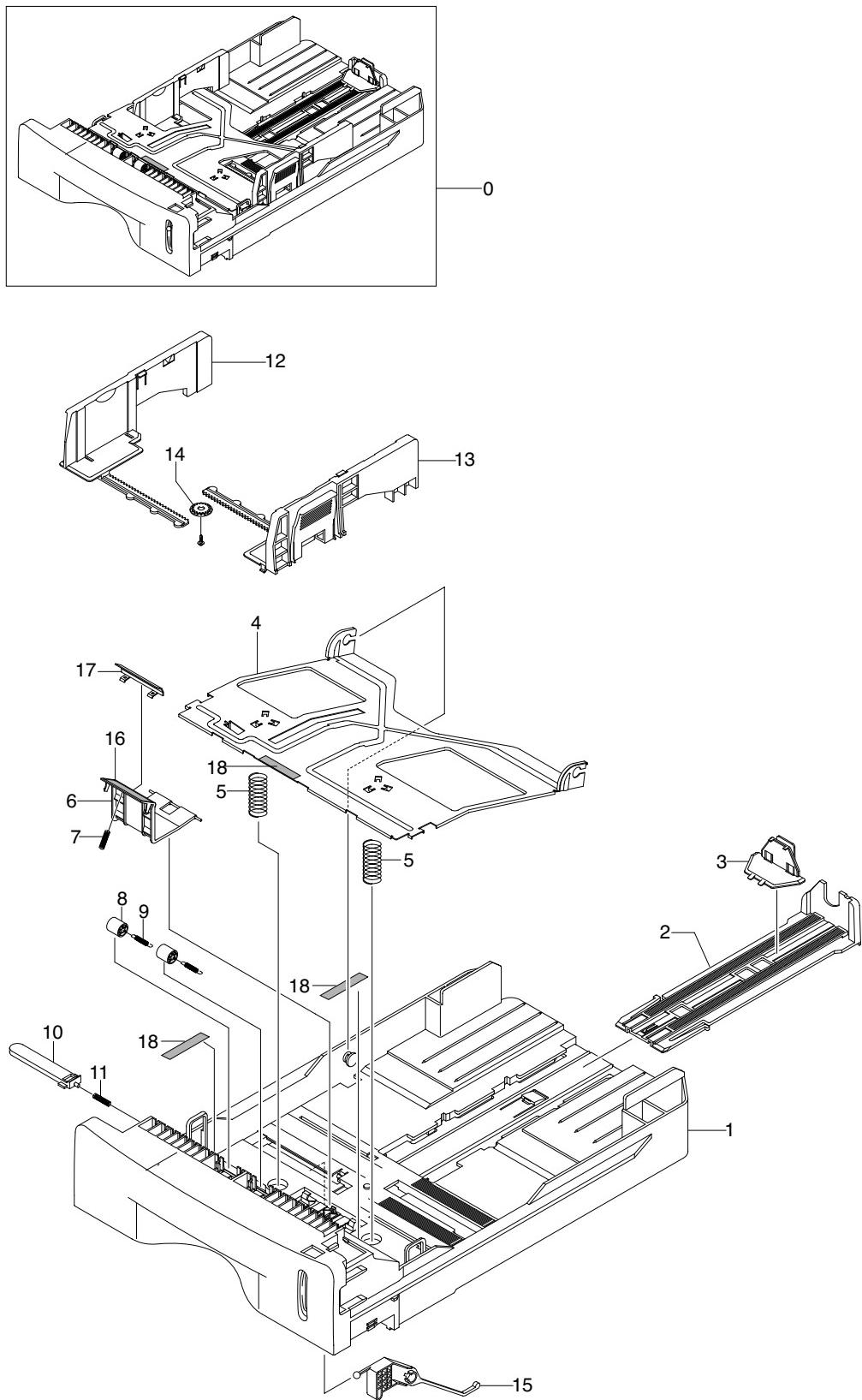
6. System Diagram

6.1 Block Diagram
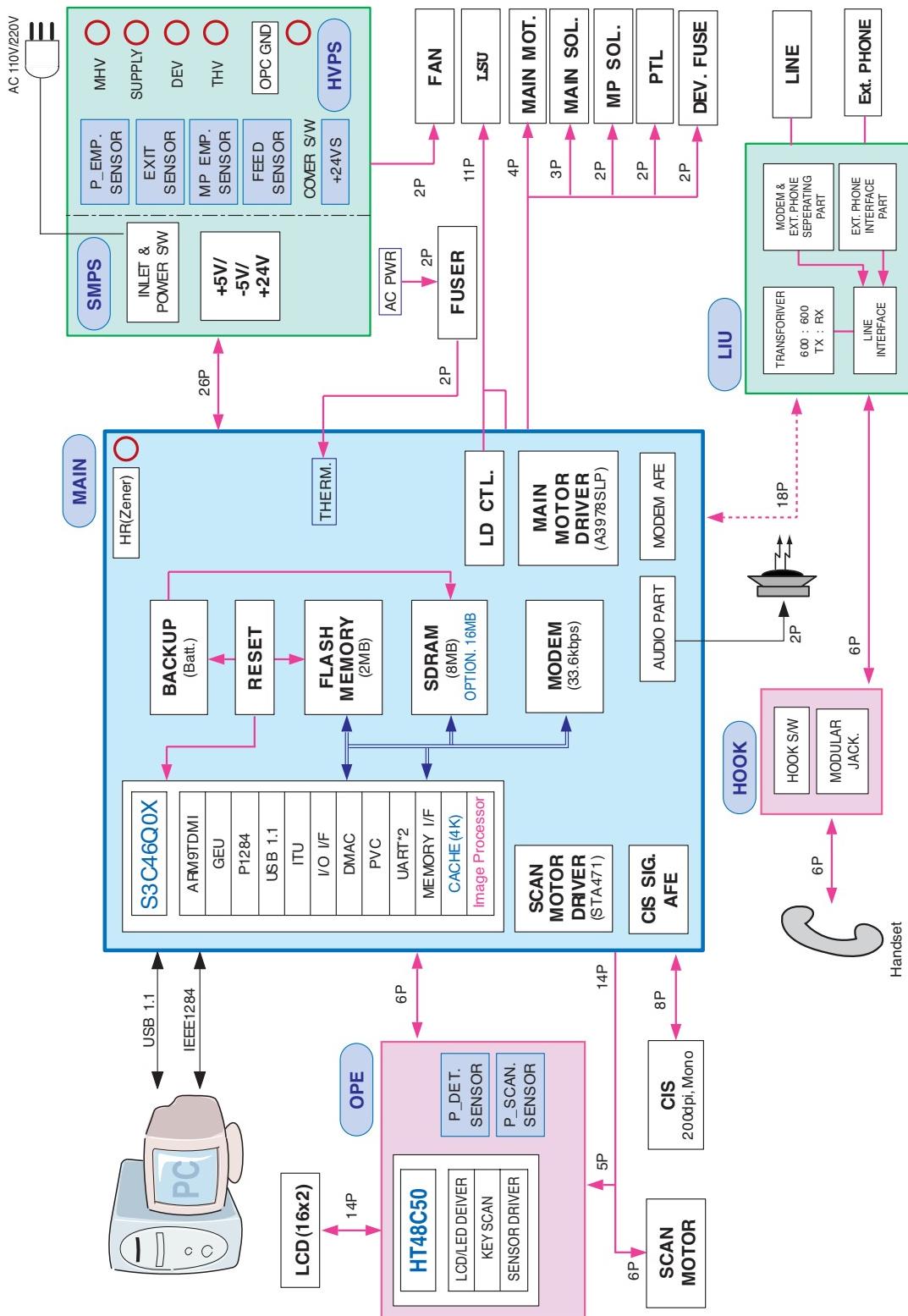
6.2 Connection Diagram
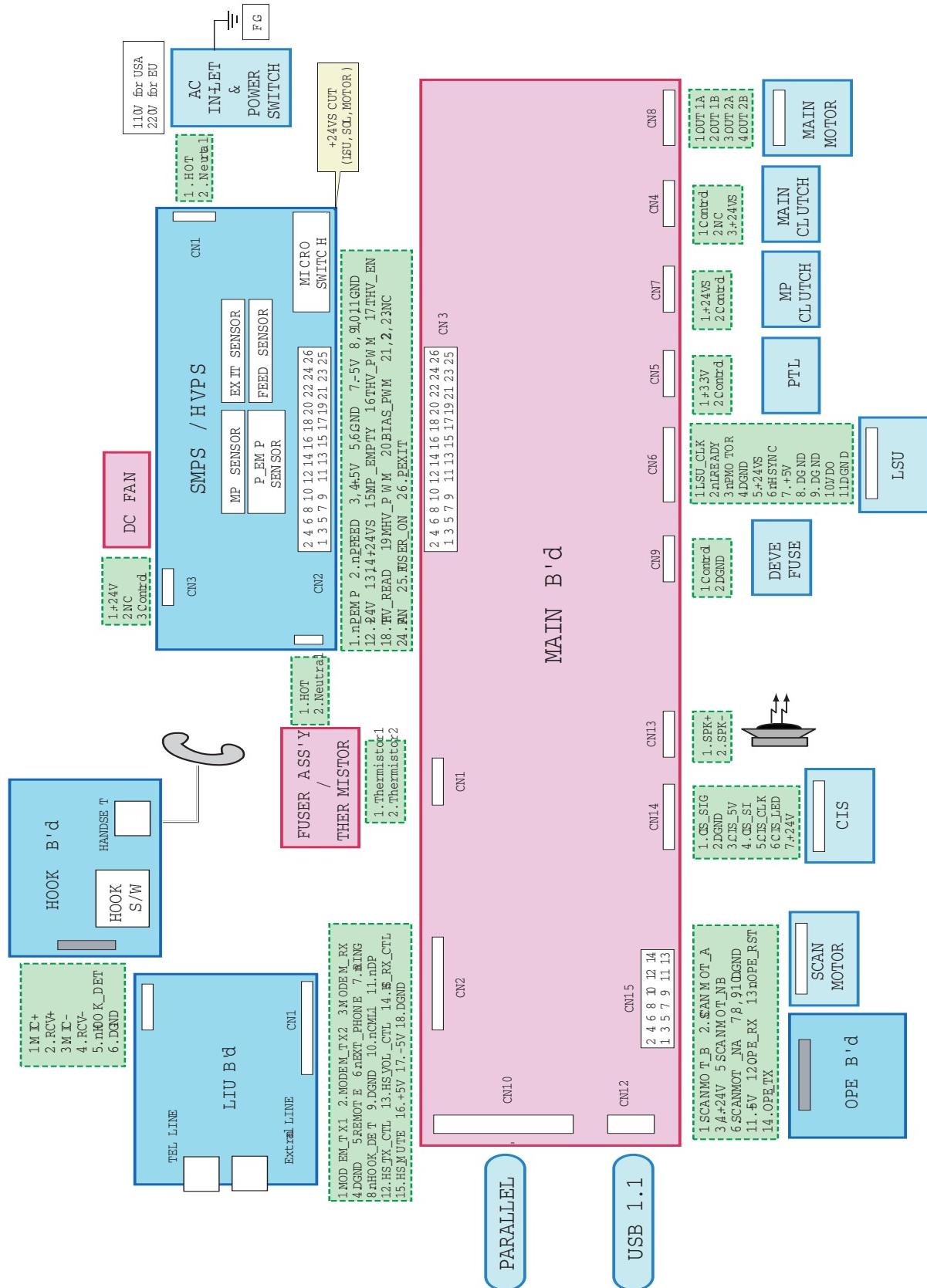
7. Reference Information

This chapter contains the tools list, list of abbreviations used in this manual, and a guide to the location space required when installing the printer. A definition of tests pages is also included.

7.1 Tool for Troubleshooting

The following tools are recommended safe and easy troubleshooting as described in this service manual.

· **DVM(Digital Volt Meter)**
  Standard : Indicates more than 3 digits.
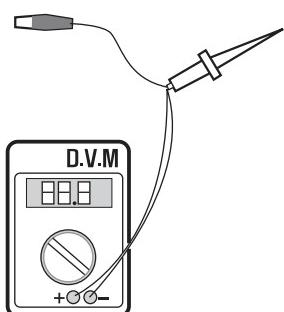
· **Driver**
  Standard : "-" type, "+" type (M3 long, M3 short, M2 long, M2 short).
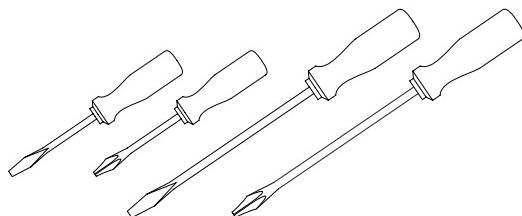
· **Tweezers**
  Standard : For general home use, small type.

· **Cotton Swab**
  Standard : For general home use, for medical service.

· **Cleaning Equipments**
  Standard : An IPA(Isopropyl Alcohol)dry wipe tissue or a gentle neutral detergent and lint-free cloth.
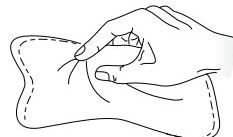
· **Vacuum Cleaner**
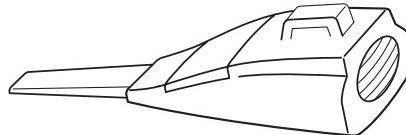
· **Spring Hook**
  Standard : For general use

· **Software (Driver) installation CD ROM**
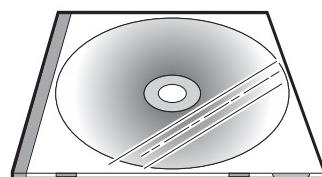
7.2 Acronyms and Abbreviations

The table in the below explains abbreviations used in this service manual.
The contents of this service manual are declared with abbreviations in many parts. Please refer to the table.

|				
ADC	Analog-to-Digital-Conversion		EPP	Enhanced Parallel Port
AP	Access Point		F/W	Firmware
AC	Alternating Current		FCF/FCT	First Cassette Feeder/First Cassette Tray
ASIC Circuit	Application Specific Integrated		FISO	Front-In, Side-Out
ASSY	Assembly		FPOT	First Print out Time
BIOS	Basic Input Output System		GDI	Windows Graphic Device Interface
BLDC Motor	Brushless DC Motor		GIF	Graphic Interchange Format
CMOS	Complementary Metal Oxide Semiconductor		HBP	Host Based Printing
CMYK	Cyan, Magenta, Yellow, Black		GND	Ground
CN	Connector		HDD	Hard Disk Drive
CON	Connector		HTML	Hyper Text Transfer Protocol
CPU	Central Processing Unit		HV	High Voltage
CTD Sensor	Color Toner Density Sensor		HVPS	High Voltage Power Supply
dB	Decibel		I/F	Interface
dBA	A-Weighted decibel		I/O	Input and Output
dBm	Decibel milliwatt		lb	Pound(s)
DC	Direct Current		IC	Integrated Circuit
DCU	Diagnostic Control Unit		ICC	International Color Consortium
DIMM	Dual In-line Memory Module		IDE	Intelligent Drive Electronics or Integrated Drive Electronics
DPI	Dot Per Inch		IEEE	Institute of Electrical and
DRAM	Dynamic Random Access Memory		Electronics	Engineers. Inc
DVM	Digital Voltmeter		IOT	Image Output Terminal (Color printer, Copier)
ECP	Enhanced Capability Port		IPA	Isopropy Alcohol
ECU	Engine Control Unit		IPC	Inter Process CommunicationEPP Enhanced parallel Port
EEPROM	Electronically Erasable Programmable Read Only Memory		IPM	Images Per Minute
EMI	Electro Magnetic Interference		ITB	Image Transfer Belt
EP	Electro photographic		RAM	Random Access Memory
LAN	local area network		ROM	Read Only Memory
LBP	Laser Beam Printer		SCF/SCT	Second Cassette Feeder/Second Cassette Tray

|				
LCD	Liquid Crystal Display		SMPS	Switching Mode Power Supply
LED	Light Emitting Diode		SPGP	Printer Graphic Processor
LSU	Laser Scanning Unit		SPL	Printer Language
MB	Megabyte		Spool	Simultaneous Peripheral Operation Online
MHz	Megahertz		SURF	Surface Rapid Fusing
MPBF	Mean Prints Between Failure		SW	Switch
MPF/MPT	Multi Purpose Feeder/Multi Purpose Tray		sync	Synchronous or Synchronization
NIC	Network Interface Card		T1	ITB
NPC	Network Printer Card		T2	Transfer Roller
NVRAM	Nonvolatile Random Access Memory		TRC	Toner Reproduction Curve
OPC	Organic Photo Conductor		PnP	Universal Plug and Play
PBA	Printed Board Assembly		URL	Uniform Resource Locator
TRC	Toner Reproduction Curve		USB	Universal Serial Bus
PCL	Printer Command Language , Printer Control Language		VCCI	Voluntary Control Council for Interference Information Technology Equipment
PCI	Peripheral Component Interconnect by Intel 1992/6/22, is a local bus standard developed by Intel and introduced in April, 1993 : A60, B60 Pins		WECA Alliance	Wireless Ethernet Compatibility
PDF	Portable Document Format		Wi-Fi	Wireless Fidelity
PDL	Page Description Language			
Ping	Packet internet or Inter-Network Groper			
PPD	Postscript Printer Discription			
PPM	Page Per Minute			
PS	Post Script			
PTL	Pre-Transfer Lamp			
PWM	Pulse Width Moduration			
Q'ty	Quantity			

7.3 Select a location for the printer

• Leave enough room to open the printer trays, covers, and allow for proper ventilation. (see diagram below)

• Provide the proper environment :
  - A firm, level surface
  - Away from the direct airflow of air conditioners, heaters, or ventilators
  - Free of extreme fluctuations of temperature, sunlight, or humidity
  - Clean, dry, and free of dust
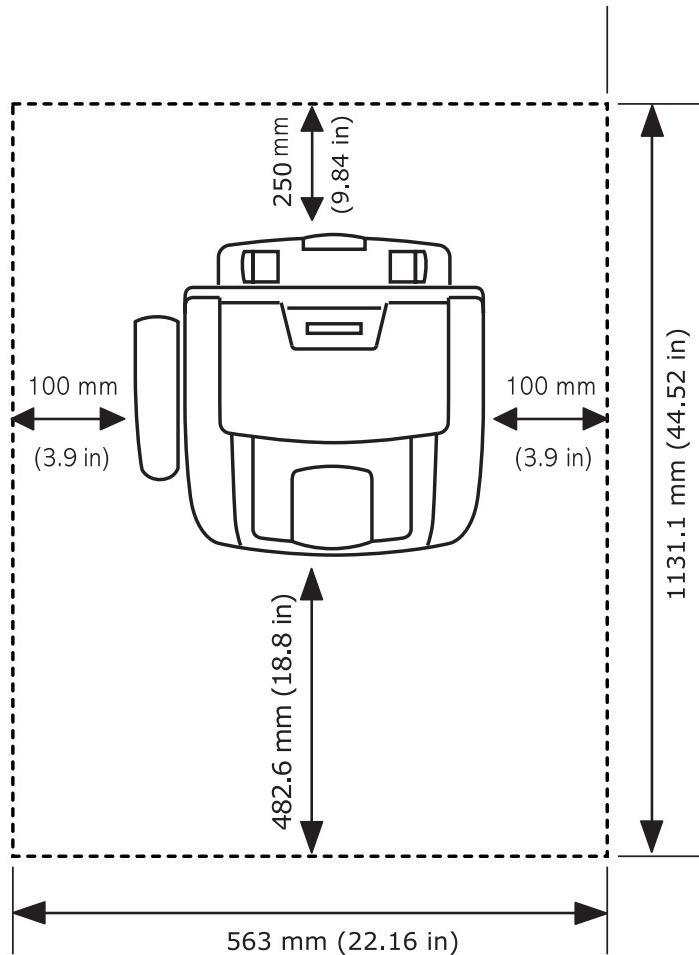
7.4 Sample Tests Patterns

The sample patterns shown below are the standard test patterns used in the factory.
The life of the toner cartridge, developer cartridge and printing speed are measured with the pattern shown below (5%). The A4 ISO 19752 standard pattern samples are reproduced reduced to 70% of the actual A4 size.

A4 ISO 19752 Standard Patterns

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ

Stephen J. Singel
Labanda Sinpat Abarress
Tendar, BSF
URANGLE

23 January 2004

Jonathan Q. Maderia

Inpert Mampem Abaress
2343 Stantin Dawer Lank
Benhibe, SDF

Mr.Maderia:

Nam liber tempor cum soluta nobis eleifend ption cogue nihil consequat, velillum.
Dolore eu zril feugiat nulla acilisis at vero eros accumsan et iusto odio dignis sim qui blandit praesent lutatum ril lobortis nisl ut aliquip exea commodo consequat. Duis autem vel eum ireure dolor in hendreritin vulputate velit esse molestie tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim viniam, quis nostrud exerci tation ullam corpersus cipit lotis nisl ut aliquip ex ea commodo consequat. Lorem ipsum dolor sit.

Amet, consectetuer adipiscing elit, sud diam nonummy nibh veniam, recneps adipiscing elit, sed diam nonummy nibtil laoreet dolore magr aliam erat volutpat. Ut wisi enim minim veniam, quisient nostrud. Sol uta nobis eleifendoptn cogue nihil imerdiet domg id quod mzim plera facer posim aum. Lorem ipsm dolor sit amet, consectuer. Duis autem eum iriure dolor in hendreritin vulputate velit cesse ea commodo mol

Stnecrep Balrecneps

B   C   D   E

Nam liber tempor cum soluta nobis eleifend option cogue nihil consequat, velillum. Dolore eu zril feugiat nulla facilisis at vero eros accumsan et iusto odio dignissim qui blandit praesent.

Singabet,

Stephen J. Singel
Demperta Aminerimum
Labanda Sinpat Abarress

SJS:dwg
FINAL

LSA
Funtres Solber Netener

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ

Muratec America, Inc.

3301 East Plano Parkway, Ste. 100
Plano, Texas 75074
(469) 429-3300 (Tel)
(469) 429-3465 (Fax)
www.muratec.com